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Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP 325 MAY 1, 1957

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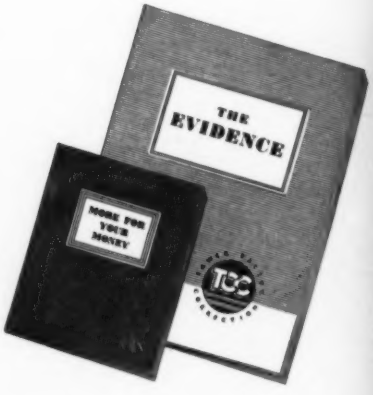

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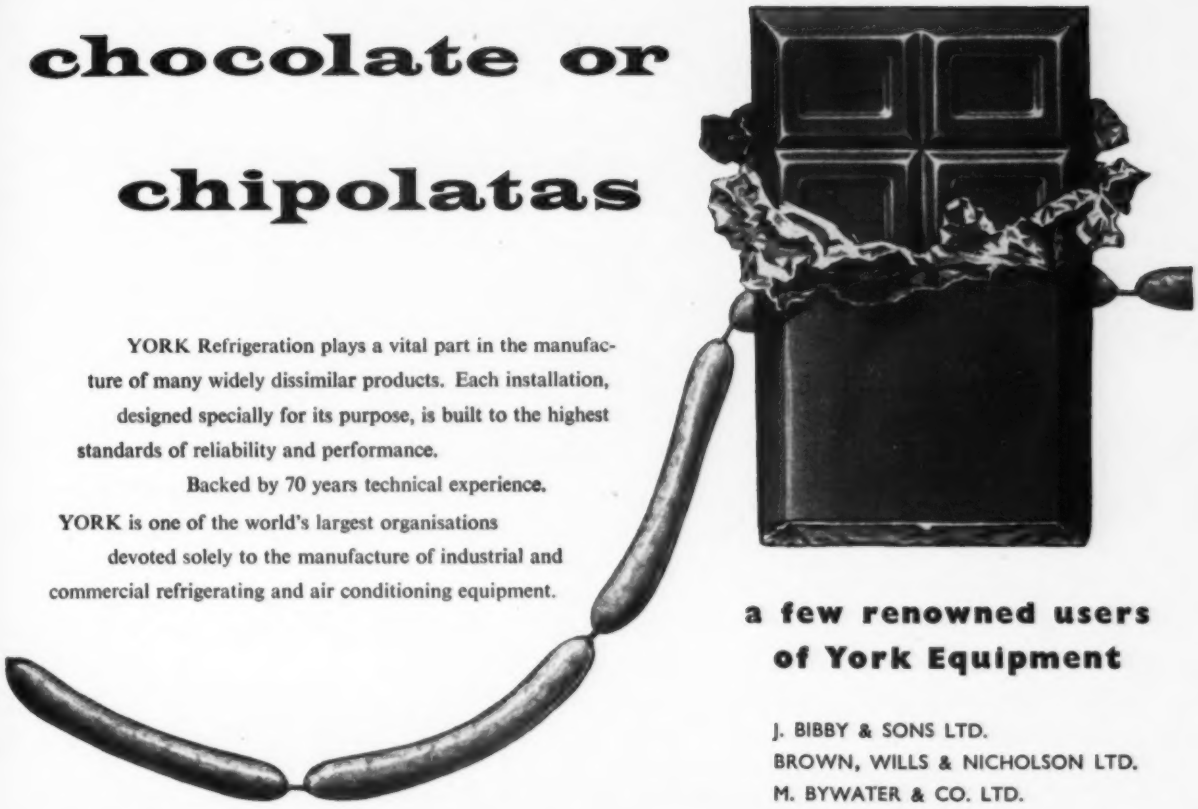

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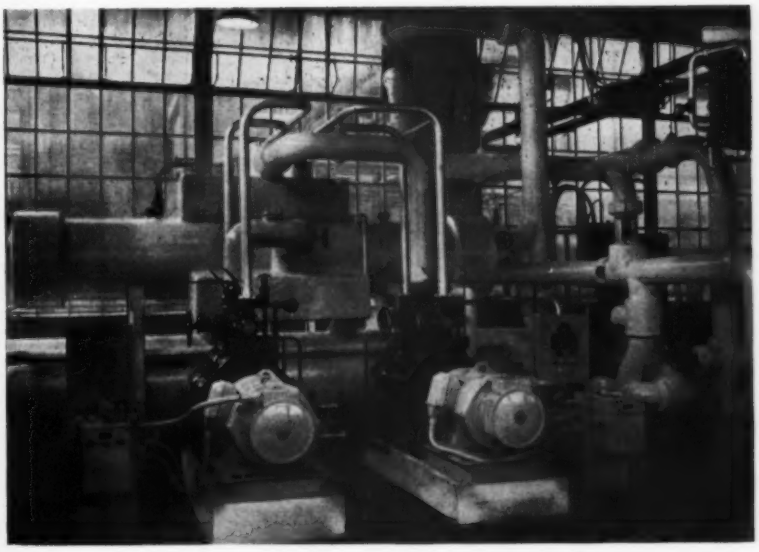

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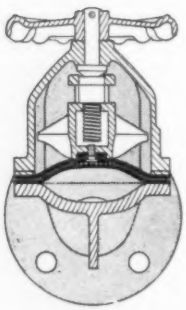

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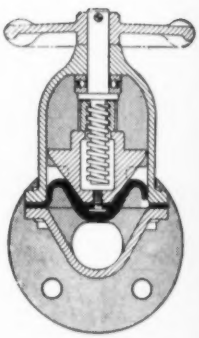

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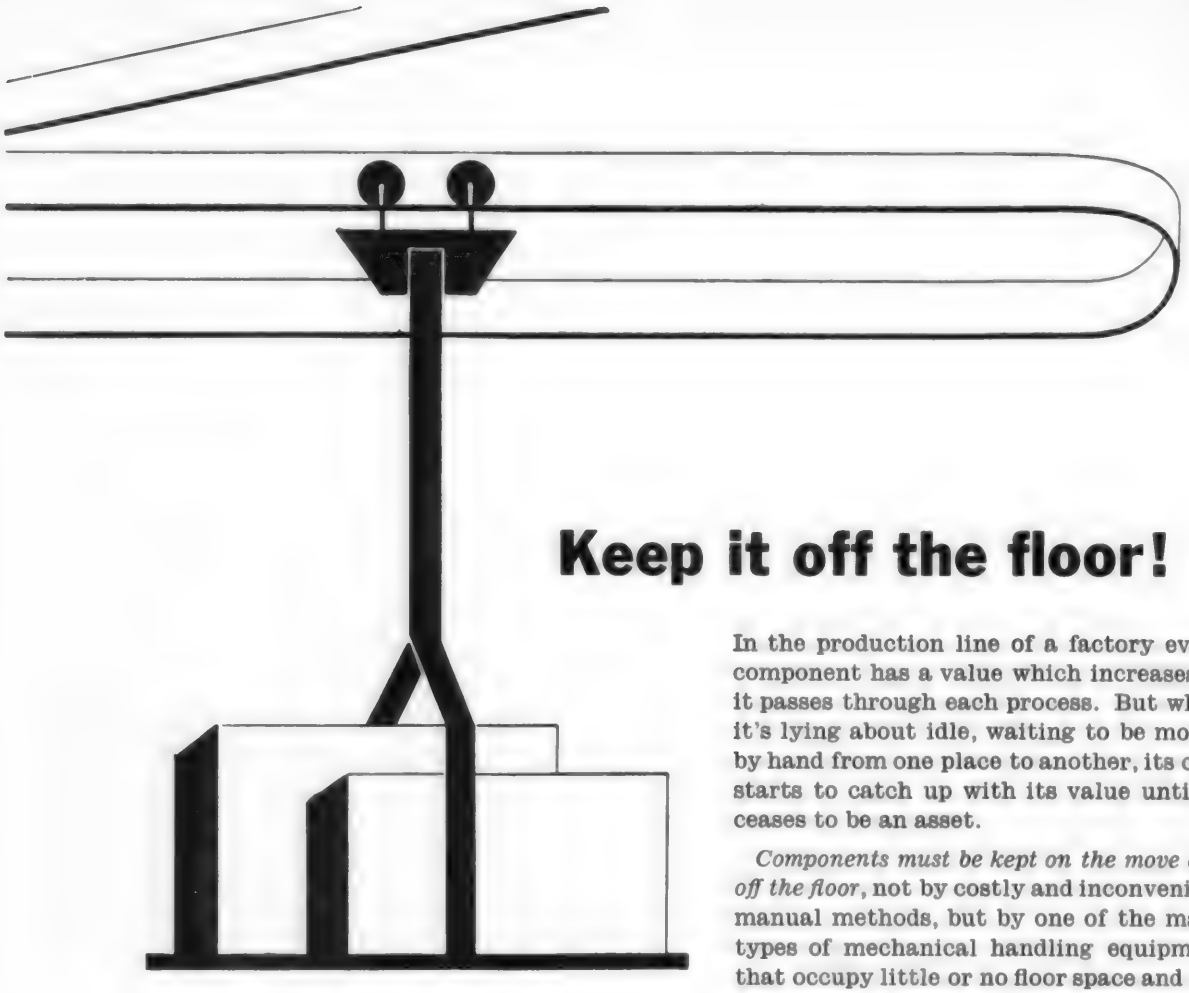

Keep it off the floor!

In the production line of a factory every component has a value which increases as it passes through each process. But while it's lying about idle, waiting to be moved by hand from one place to another, its cost starts to catch up with its value until it ceases to be an asset.

Components must be kept on the move and off the floor, not by costly and inconvenient manual methods, but by one of the many types of mechanical handling equipment that occupy little or no floor space and can move parts horizontally or vertically to any part of the shop.

It's a fact that mechanical handling can do more for production than any other factory technique. This is only one of the many ways in which Electricity is playing a vital part in the drive for greater productivity.

Electricity for Productivity

Ask your ELECTRICITY BOARD for advice and information, or get in touch with E.D.A. They can lend you, without charge, films about the uses of electricity in industry. E.D.A. are also publishing a series of books on Electricity and Productivity. Titles now available are: Electric Resistance Heating, Electric Motors and Controls, Higher Production, Lighting in Industry, Materials Handling, and the latest addition to the series, Induction and Dielectric Heating. Price 8/6, or 9/- post free.

Issued by the
British Electrical Development Association
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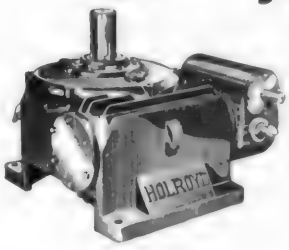
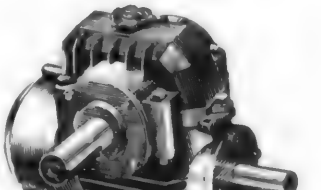
just to keep you up to date...

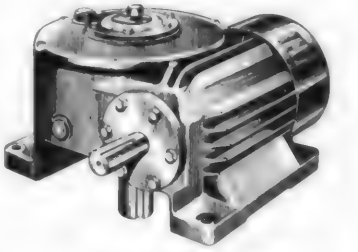


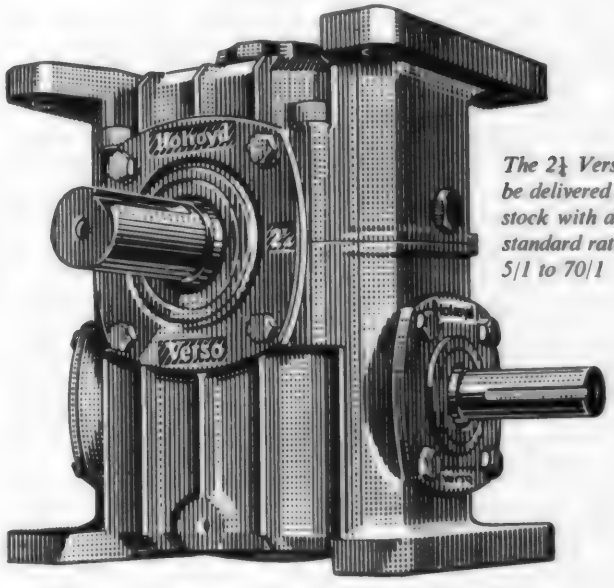
we'd like to remind you there are now *seven* in the illustrious Holroyd Gear family, all of them eager to help on any work involving mechanical handling. The latest addition is the Holroyd Verso, a sturdy 2¼ inch centre distance gear box designed for pretty heavy work. It can be used either as an underdriven or an overdriven unit and its scope of application is very wide. If you're aiming to keep up to date, why not send for our

new 50-page book E 56F

where you will find full descriptions of all our worm gear units, from 1⅛ to 24 inch centres.







The 2¼ Verso unit can be delivered from stock with any standard ratio from 5/1 to 70/1

Holroyd 90 YEARS OF GEARS

JOHN HOLROYD & CO. LTD · MILNROW · LANCASHIRE

SCANDURA P.V.C. belting

helps the food industry

Cake packing on a 'Motaveyor' (by courtesy of Knightsbridge Cake Limited, Manchester)

Fruit bottling on a 'Motaveyor' conveyor (by courtesy of J. Mawdsley Ltd., Wigan)

Scandura conveyor in a fish canning factory (by courtesy of Fisher & Ludlow Ltd., Birmingham)

As the pioneers of P.V.C. covered conveyor belting British Belting & Asbestos have supplied their SCANDURA belting for many varied applications. Due to its resistance to contamination and its hygienic qualities SCANDURA has become the obvious choice for food conveyor belting. Its lasting qualities had already been proved in food factories two years before its first introduction in Britain's coal mines in 1948, and its fire resistant properties have brought a hitherto unknown safety margin where conveyor fire hazards originally existed. SCANDURA is available now, in varying widths and thicknesses to suit all applications.

SCANDURA P.V.C. BELTING IS MANUFACTURED BY **BBA**

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THE NEW DE LAVAL Self-opening Separator

automatic sludge discharge

Eliminates stoppages for bowl cleaning—Reduces man power—puts your Liquid/Solid or Liquid/Liquid/Solid separation on an automatic basis.

A special De Laval hydraulic system enables sludge to be discharged from the separator while running at full speed. This device can be operated manually or arranged for fully automatic operation by an electronic system

This new centrifuge is designed for the rigid demands of the chemical and process industries —all liquid contact parts are of stainless steel— Clarified liquid is discharged under pressure giving the advantages of a closed system—It is ideally suited for the clarification of:— beer, beer-wort, wine, molasses, caustic lye, fruit juice, anti-biotics, etc.

The De Laval PX209.OOS Self-opening separator Purifier models for Liquid/Liquid/Solid separations are also available. Write for catalogue No. 22961

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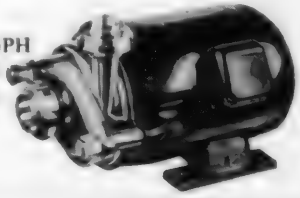
PLATE HEAT EXCHANGERS

for all continuous Heating—Cooling—Pasteurising problems

Easy cleaned and Stainless steel

CENTRIFUGAL PUMPS

Capacities 220—13.00 GPH Lifting heads 15—165 feet.



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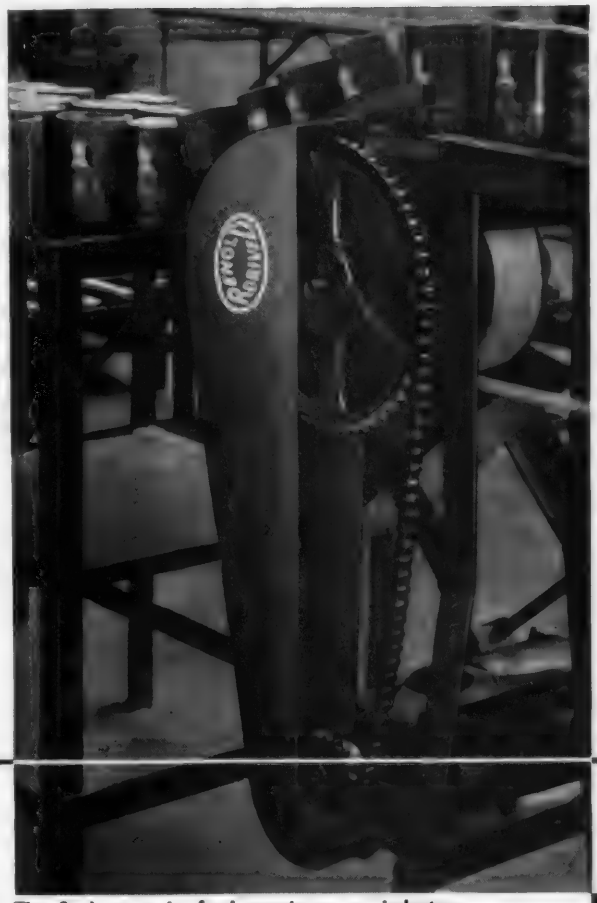

The final stage in food canning — an industry where continuity of output and a clear floor are essential. This can conveyor is powered by an electric motor with Renold stock chain drive — a combination which achieves both objects.

For conversions or new equipment specify **RENOLD stock chain drives.** Quiet, positive and smooth running, they will give you years of dependable, trouble-free service, outlasting other types of transmission many times.

Drives from fractional to 140 h.p. can be supplied **FROM STOCK** in 25 different ratios, easily selected from chart in our Catalogue Ref. 116/93

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RENOLD—*the FIRST name in precision chain*

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Accurate, reliable readings and rapid response from this

TEMPERATURE TRANSMITTER

one of the

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components for industry

In many industries where there are temperatures to measure and/or control, this temperature transmitter does a wonderfully efficient job.

One of Negretti & Zambra's Pneutechnique components, it converts temperature into linear output air pressure which is transmitted through small-bore tubing to the receiving instrument.

The inherent robustness of the mercury-in-steel method is combined with a particular sensitivity and precision peculiar to all our pneumatic components.

Range extends up to 1200° F. Spans of 30 F° or 15 C° are normally available, also compensated models and models for low temperature applications.

The transmitter can be used to actuate an air-operated controller to maintain temperature within specific limits.

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Metal Box are expert at solving every type of packaging problem, whether it involves research into the reaction of contents with packaging materials, the examination of the effects of prolonged storage, or advising on filling or closing techniques. The result of using their specialist skills and experience is an exactly suitable container for each individual product. Metal Box 'know-how' serves the food industry well.

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Metal Box designers have hundreds of case histories to call on when planning your container.

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To advise on the installation and maintenance of high-speed filling and closing machinery at the end of your production lines.

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The largest laboratories in the country devoted entirely to research into packaging problems.

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A world-wide service that studies marketing trends and can supply up-to-the-minute information in any consumer field.

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Jars for Confection washed to perfection

Returned sweet jars — sticky, labelled and stained are conveyed through this machine where they are carried through the high temperature pressure washing chambers to return through the hot air drying tunnel to the loader clean, sterile, and dry—fully satisfying every requirement of the Health regulations. This is but one of hundreds of washing problems Dawson machines handle quickly, safely and economically. If you wash tins, trays, jars, bottles, moulds, utensils or dishes Dawsons can be of good service to you.

Washing Plant for
BISCUIT TINS
BAKERS' TRAYS
FISH BOXES
BOTTLES & JARS
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The machine illustrated washes 5 lb. convex jars at 3/400 jars per hour.

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COFFEE EXTRA
32/6 PER LB. DELIVERED
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Two of our outstanding specialities for the Confectionery Industry

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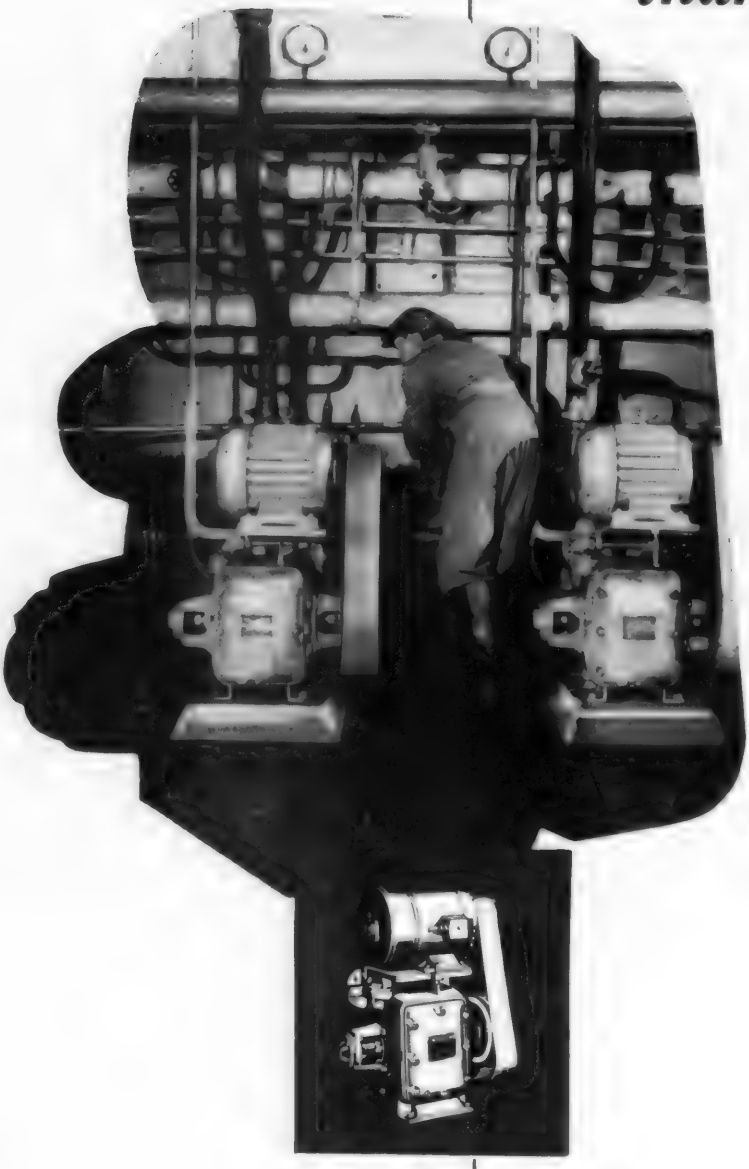
There's more in pumping than buying a pump



Megator's contribution goes far beyond supplying pumps. We were called in at the start of this job—to study the site and plant arrangement, pipework and control system. The result has been a fine installation and a satisfied customer. Megator engineers spend their lives solving other people's pumping problems and it is only common sense to call on that experience when you need it.

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***High suction lift** permits installation in convenient positions.*

***Self-priming** inherent without any added device.*

*"**Snoring**" ability sucks out the last drop.*

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***Simple.** Designed for easy maintenance.*

***Capacities** from 4 to 250 galls. per minute.*

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WITH UGB GLASS CONTAINERS

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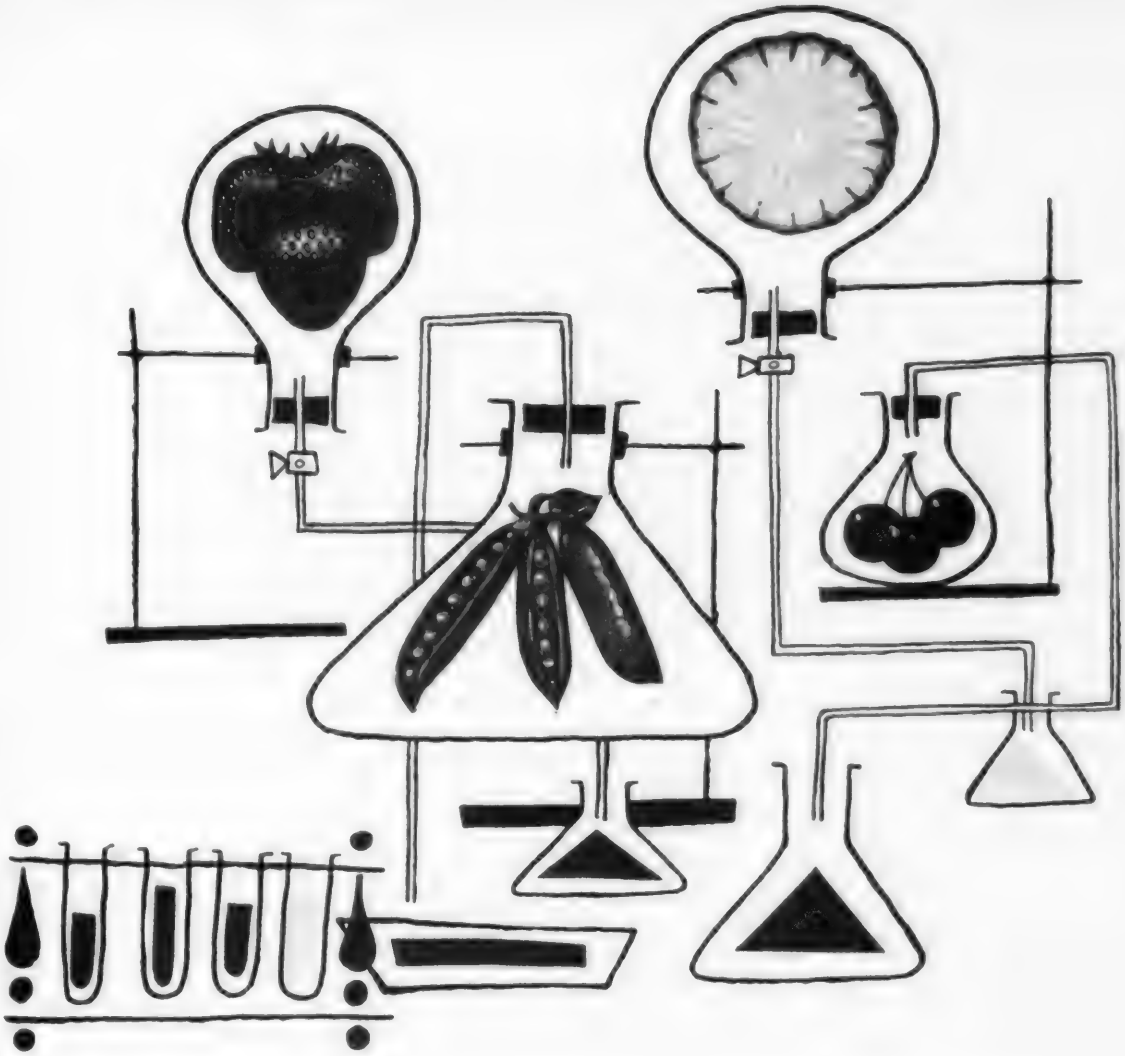

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Their purity is protected by delivery in sealed package.

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can now be fitted to your

Kellie 11FP filling machine

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There is now an automatic GARDA CAP FEED to suit almost every packer's plant and layout.

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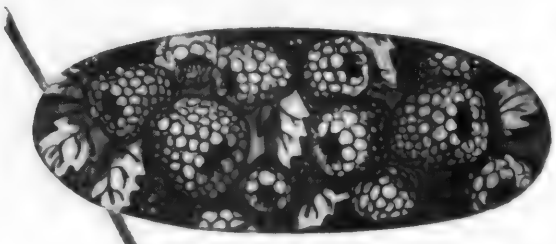
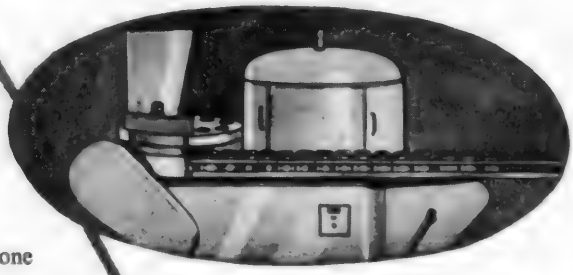


. . . all along the line there's



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It only requires 'trouble' at one point in your production line to cause serious dislocation and loss of valuable production. B.H.C. are geared up to trace the origins of micro-organisms, yeasts and moulds in food processing plant. They are backed by over 25 years experience and have Analytical, Chemical and Bacteriological Laboratories which have not only isolated the causes of trouble, but have pioneered Quaternaries in the form of DECIQUAM to overcome them and prevent their repetition. All you need to do is to write or phone for a B.H.C. Technical Representative to call, why not make a note of the number, LIBerty 1021.

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'2008' The first completely rinsable 'Quat' in the world, yet still retaining the fullest sterilising qualities.

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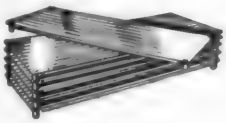
The CHIEF ENGINEER says—

'RACKS ARE OUT OF DATE—WE USE WARCO STACKING CONTAINERS'



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★ HYGIENIC—EASY TO CLEAN
★ POSITIVE AND RIGID STACKING

The illustration shows a strong aluminium one piece pressed container of 2,000 cu. ins. capacity, beaded top edge, fitted with die-cast stacking corners and drop down handles.

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IN ASSOCIATION WITH **ALMIN LIMITED** STOKE POGES · BUCKS

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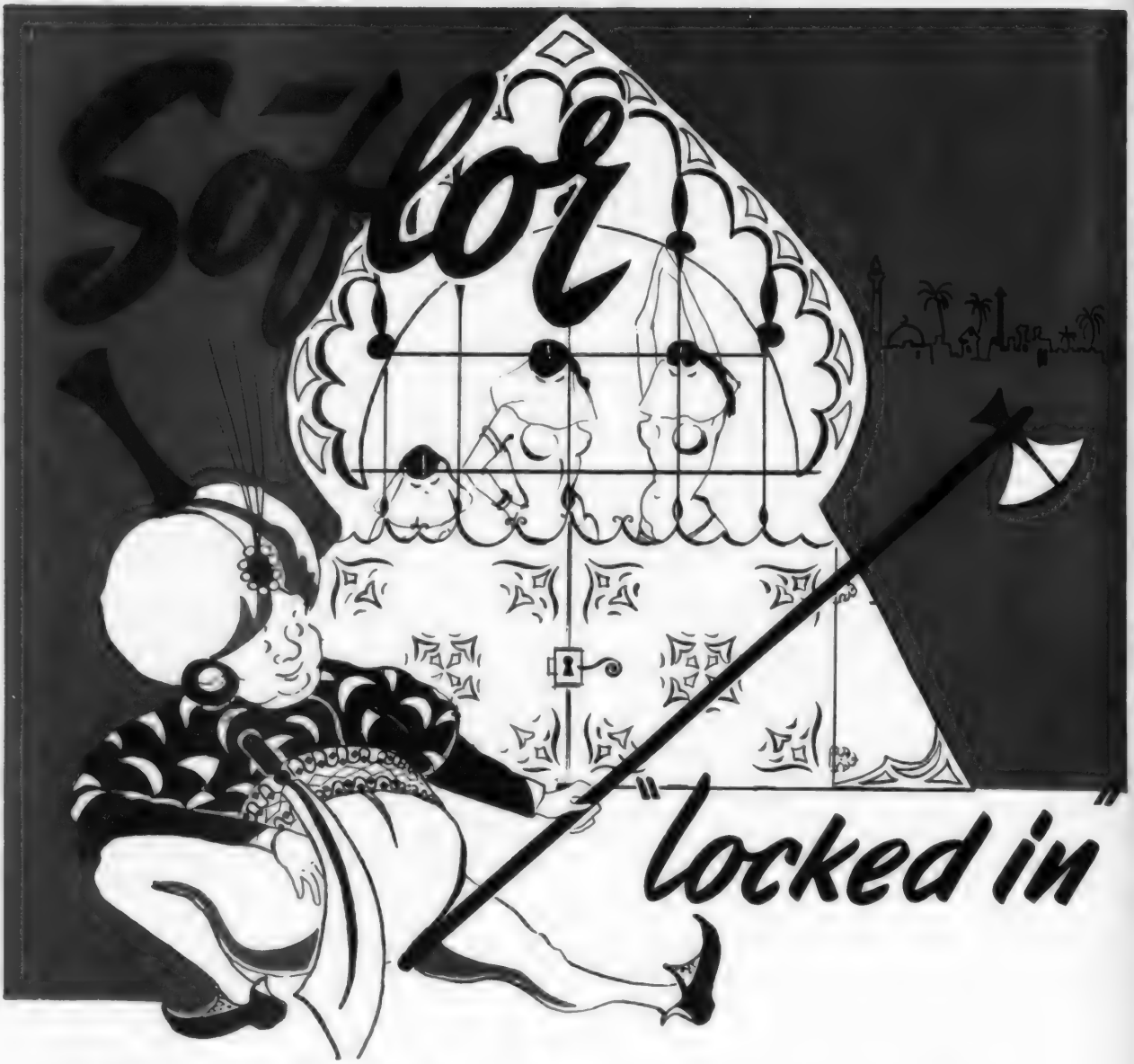

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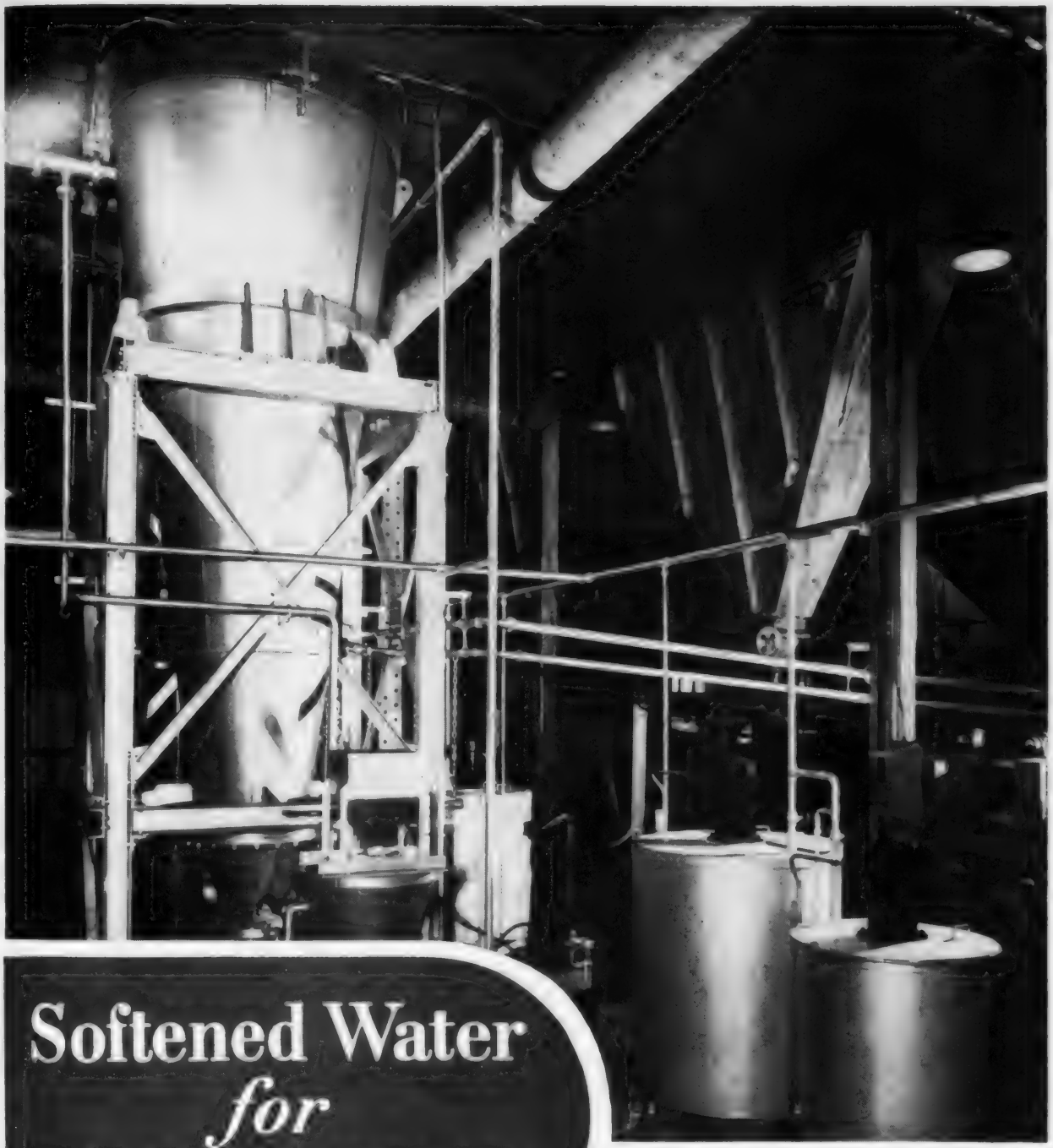

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OF YOUR MATERIALS . . . .

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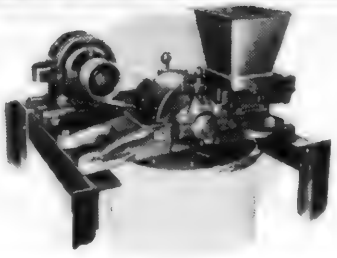
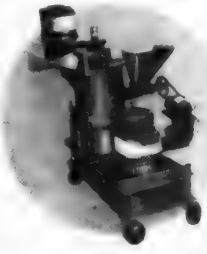
The **MIKRO-PULVERISER**



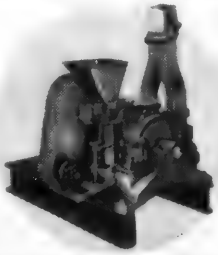
A high speed mechanical pulveriser offering a wide range of particle sizing, granular to fine grind (10—300 mesh) safe and economical for both wet and dry grinding.
Available in six sizes with capacities from 10—10,000 lbs. per hour.

The **MIKRO-BUD**



A new vertical hammer mill with built in air classifier for the reduction of solids to within the 80—10 micron range. Particle sizing can be changed in seconds while the machine is in operation.
10°F. maximum temperature rise.
Available in two sizes giving 35/70 lbs. per hp/hour.

The **MIKRO ATOMISER**



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Available in three sizes with capacities from 5—5,000 lbs. per hour.

100% dustless operation can be achieved by connecting any of the above machines to one of our MIKRO FIL UNITS

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Exclusive Manufacturing Licencees for Pulverising Division, Metals Disintegrating Company Inc., Summit, New Jersey, U.S.A.

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Wheels of industry the world over are turned

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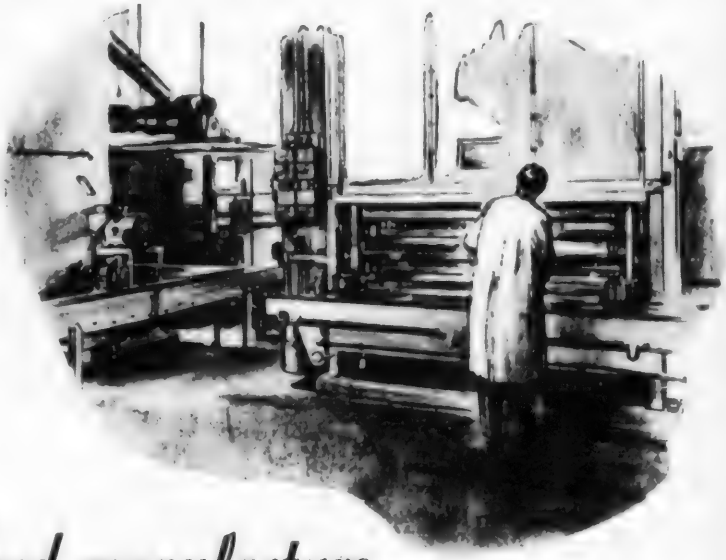

in food manufacture

Whenever a power drive is needed, there is a BTH motor that will do the job efficiently and economically. In industries all over the world, BTH motors are helping to increase production. Over half-a-century's experience of this branch of electrical engineering enables BTH to offer the motor with the mounting, enclosure, rating and performance best suited to the application.

BTH factories are exceptionally well equipped to make both ***STANDARD*** *and* ***SPECIAL*** *machines in large quantities*

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BRITISH THOMSON-HOUSTON
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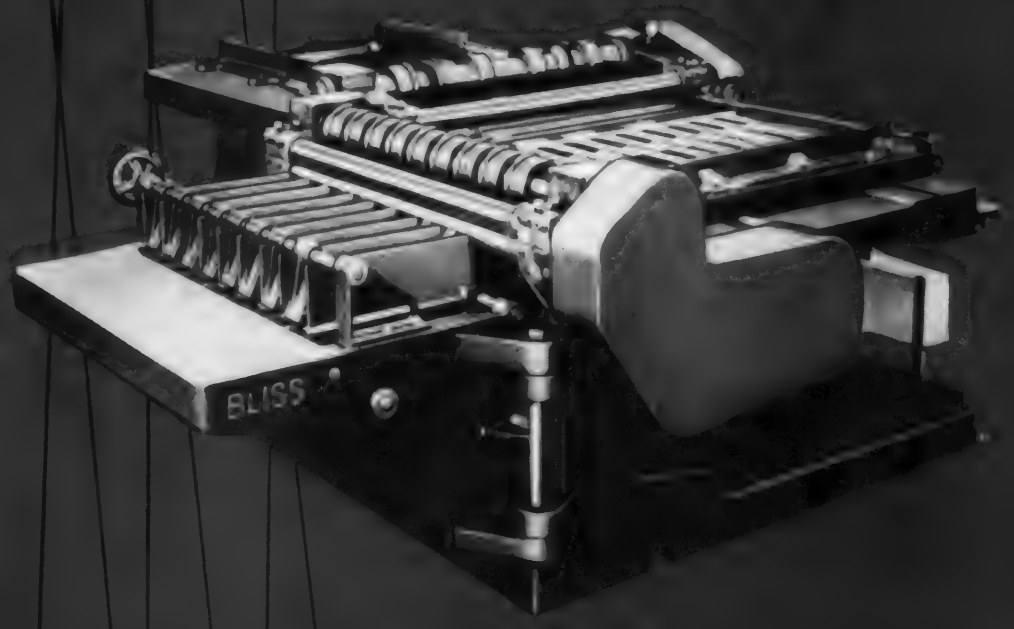
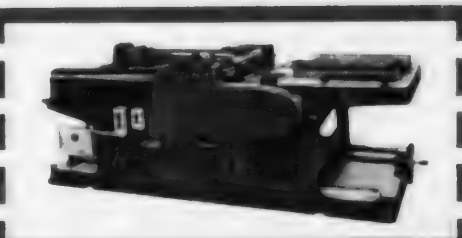
for high speed can lines



The new Bliss No. 5225, Automatic Duplex Slitter quickly repays capital cost in higher speed, greater accuracy and far less setting times.
Another Bliss development in a rapidly expanding range of high speed can machinery.



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SINCE 1857

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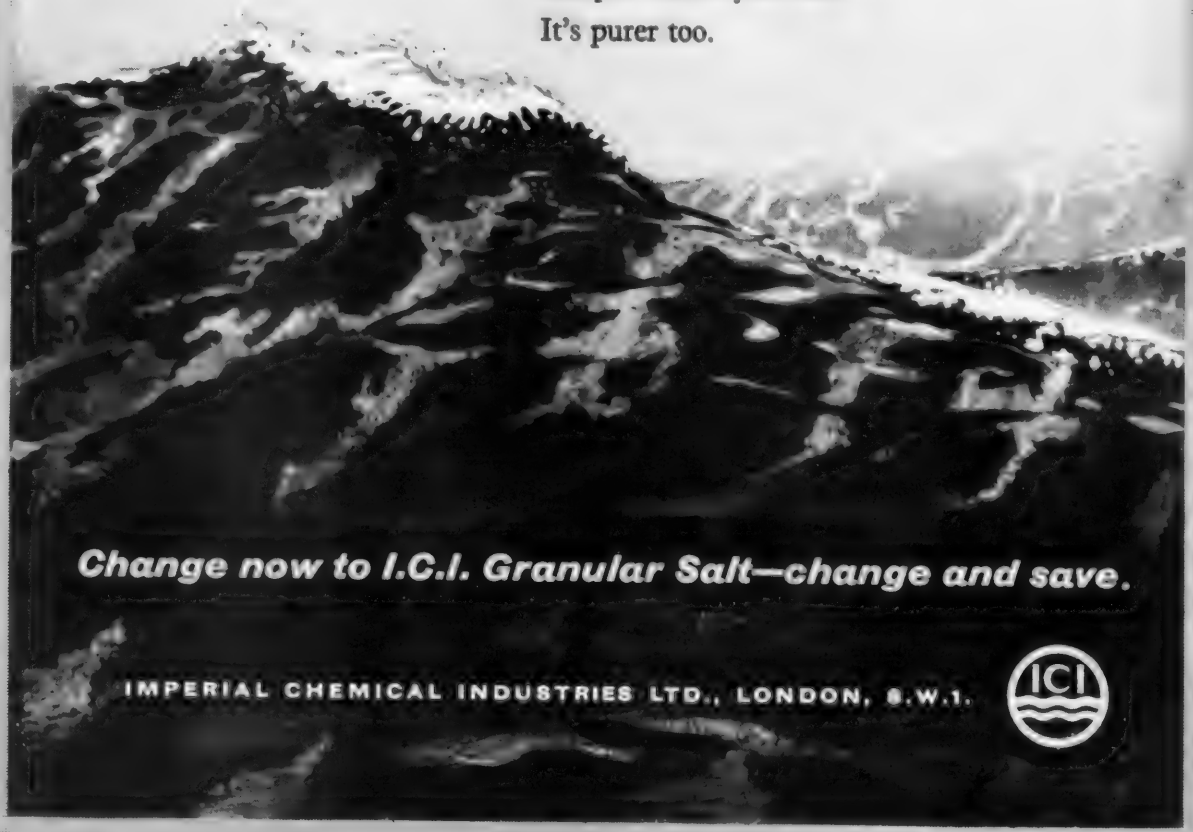

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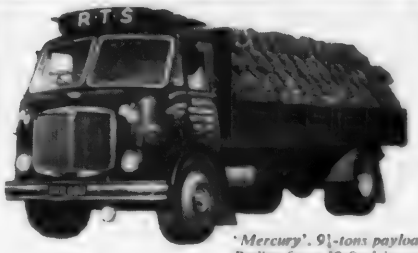

'Mercury'. 9½-tons payload. 14-tons gross. Bodies from 10 ft. 1 in. - 21 ft. 4 in.

Given the speed, there are sound arguments for using a big capacity diesel-engined vehicle. The diesel engine has a relatively low fuel consumption; properly maintained, it needs little attention, runs for long periods between overhauls and lasts for years.

From May 1st every diesel-engined A.E.C., from the 14-tons gross 'Mercury' to the 24-tons gross 'Mammoth Major', will be allowed to travel at 30 m.p.h. For users of small vehicles this opens up a new concept of big vehicle operation. A.E.C. goods vehicles, built for economical running and sustained reliability, are used by hundreds of operators all over Britain. They know that the big capacity vehicle pays.

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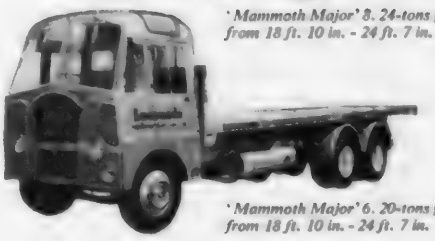
'Mammoth Major' 8. 24-tons gross. Bodies from 18 ft. 10 in. - 24 ft. 7 in.



'Mammoth Major' 6. 20-tons gross. Bodies from 18 ft. 10 in. - 24 ft. 7 in.

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Power, Performance, Capacity
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Heat transfer is rapid and efficient, resulting in a uniformity of treated material and a greatly improved final product. Rota-Pro requires minimum operator attention, maintains the highest standards of hygiene and offers big economies in processing time and labour. Wide capacity range.

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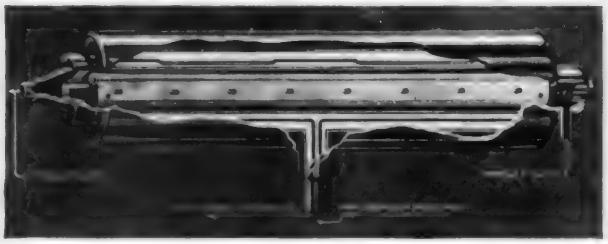

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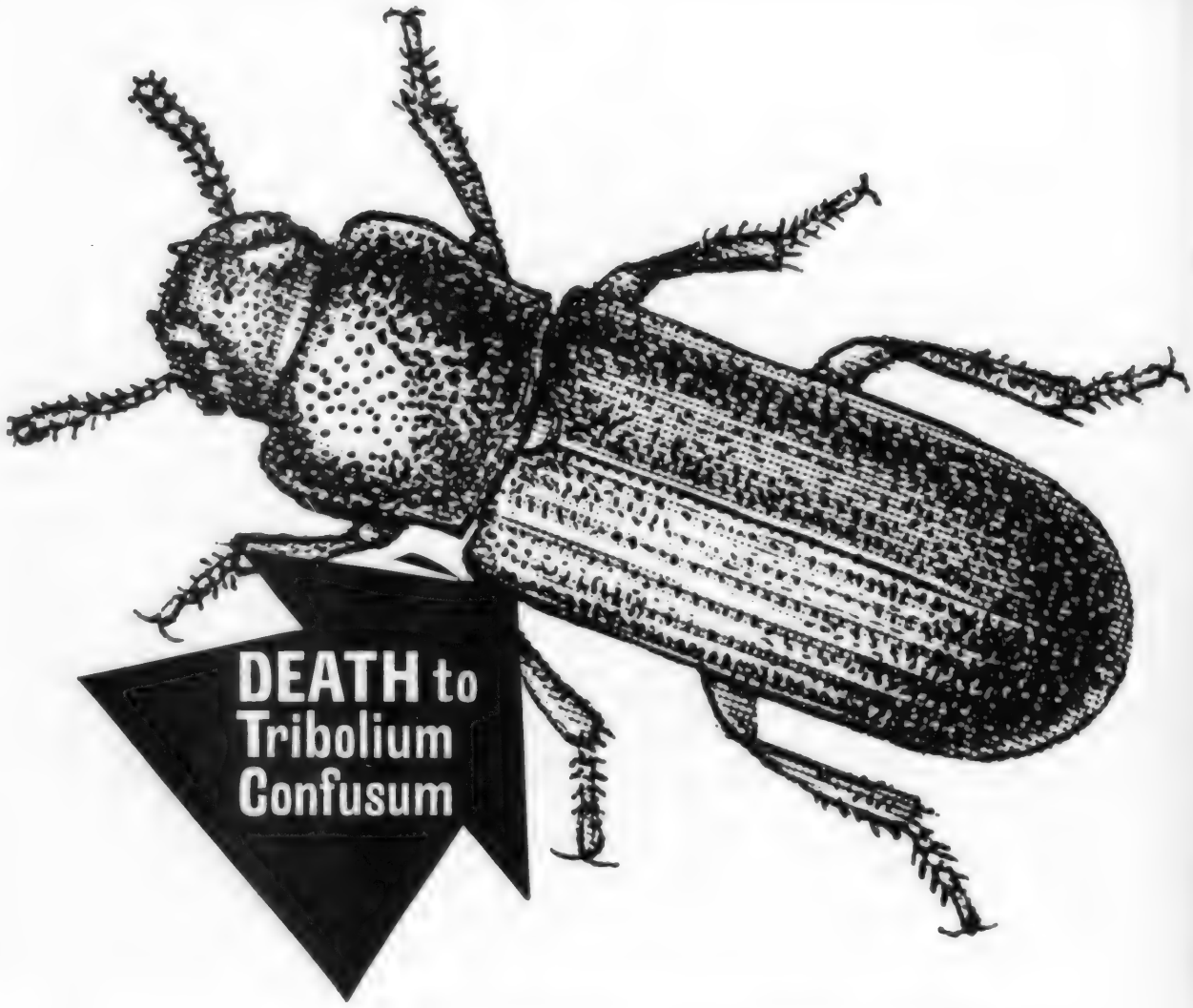

Insect pests attacking stored food products are most safely controlled with a " Pybuthrin " insecticide! Containing African pyrethrum synergised with piperonyl butoxide, " Pybuthrin " is the basis of a new range of non-poisonous but potent Cooper insecticides that are completely safe to use wherever foodstuffs are processed or stored. For example, infestations of the Confused flour beetle (*Tribolium confusum*) can be prevented from developing in mills, bakeries, cereal and biscuit factories by routine spraying of store-room walls and commodities with " Pybuthrin " Insecticide No. 44. Normal rate of application is only 1 gallon to 1,000/2,000 square feet, the frequency of treatment varying according to local conditions. If you have an insect problem in your premises, write for free advice and further information about " Pybuthrin " Insecticides.

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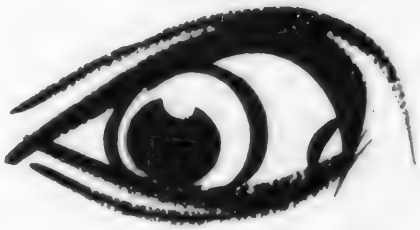
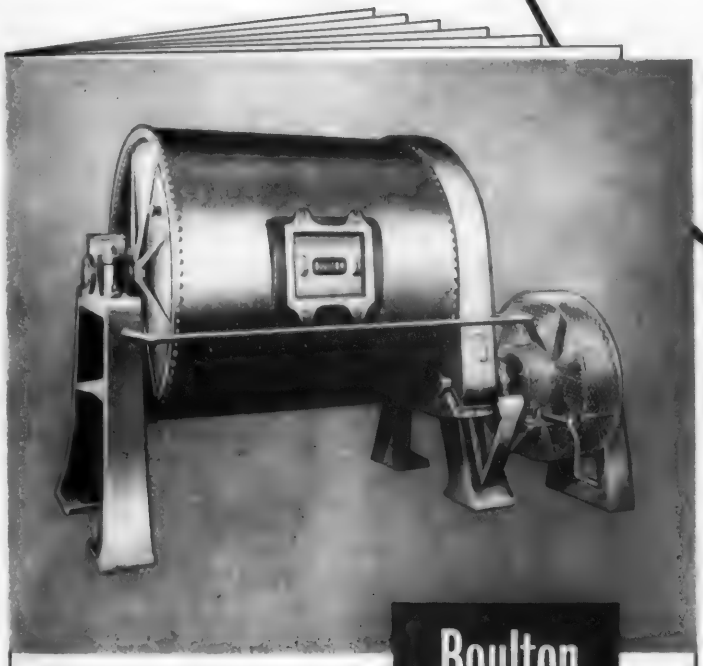


With an eye to a machine

In common with most industries, ball milling in recent years has seen a steady advance in technical design. Equipment has reached a high degree of specialisation and efficiency with a wide range of specifications to suit different processes. With these facts in mind Wm. Boulton Ltd. offer this booklet as a comprehensive guide to engineers and executives faced with the problem of selecting plant.



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BOOKLET NO. 109

A mine of information

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with the COLT DUAL PURPOSE FIRE VENTILATOR

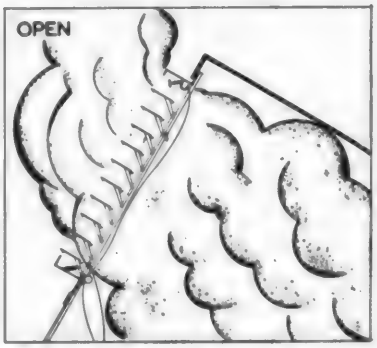
at AC-Delco, Division of General Motors Ltd., Southampton.

A study of industrial fires in Great Britain and in America has shown that the primary cause for the spread of fire is the super-heated air, smoke and explosive gases trapped under the roof. They build up in heat and intensity from the fire below and cause flash fires. Furthermore, the smoke rapidly extends downwards, entirely filling the premises and preventing the work of the fire fighters.

Colt have successfully solved this problem with the design of the Dual Purpose Fire Ventilator which **provides ventilation during normal conditions and—in the event of fire—functions as a heat and smoke exhaust.**

The installation of heat and smoke exhausts is standard practice in America and is rapidly being adopted by leading industrialists in the United Kingdom. Already, 1,290 Colt Dual Purpose Fire Ventilators have been installed in General Motors buildings in this country.

Write to Dept. V9/5 for paper " Some Aspects of Fire Prevention in Industrial Buildings " by M. J. Reaney, which deals fully with this matter.



The insets illustrate the action of the ventilator as a Heat and Smoke Exhaust. In the event of fire, the fusible link fuses, providing Automatic Escape for Super-Heated Air and Smoke.

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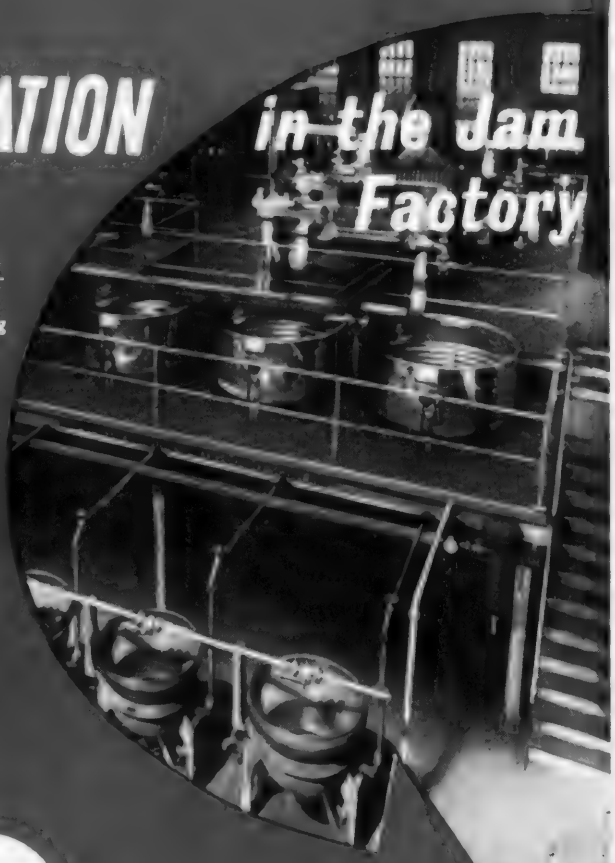
Reduce costs and increase production with Kellie Automation Equipment. Write for details of how your jam finishing production line can be made fully automatic.



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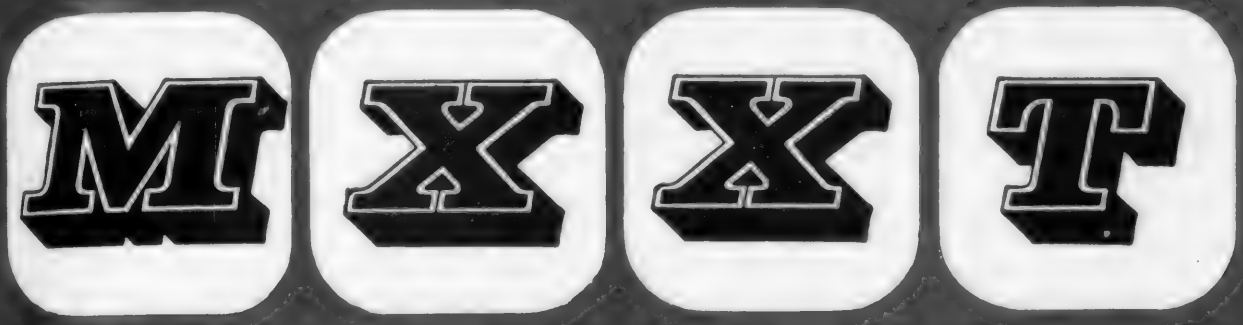

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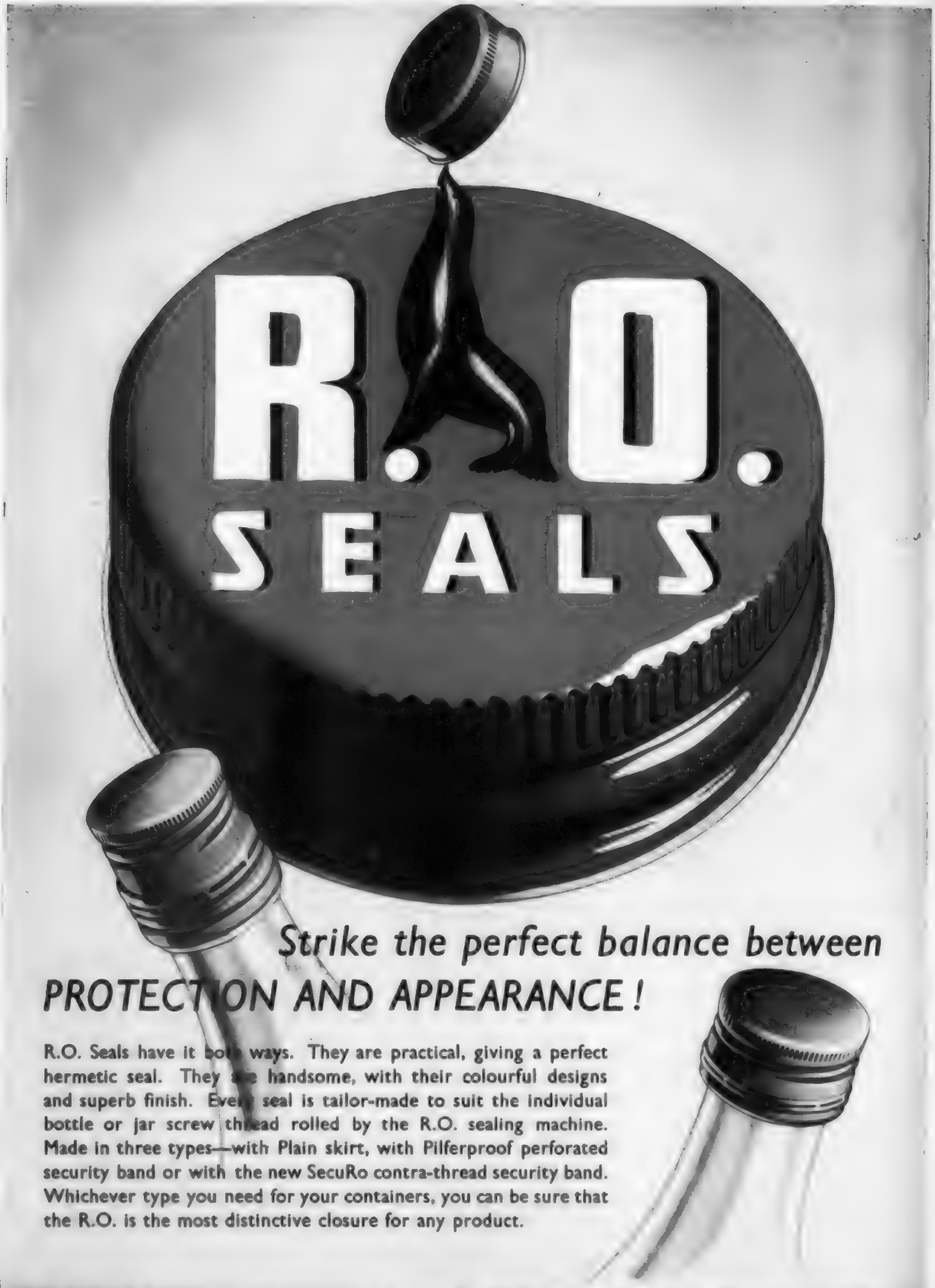

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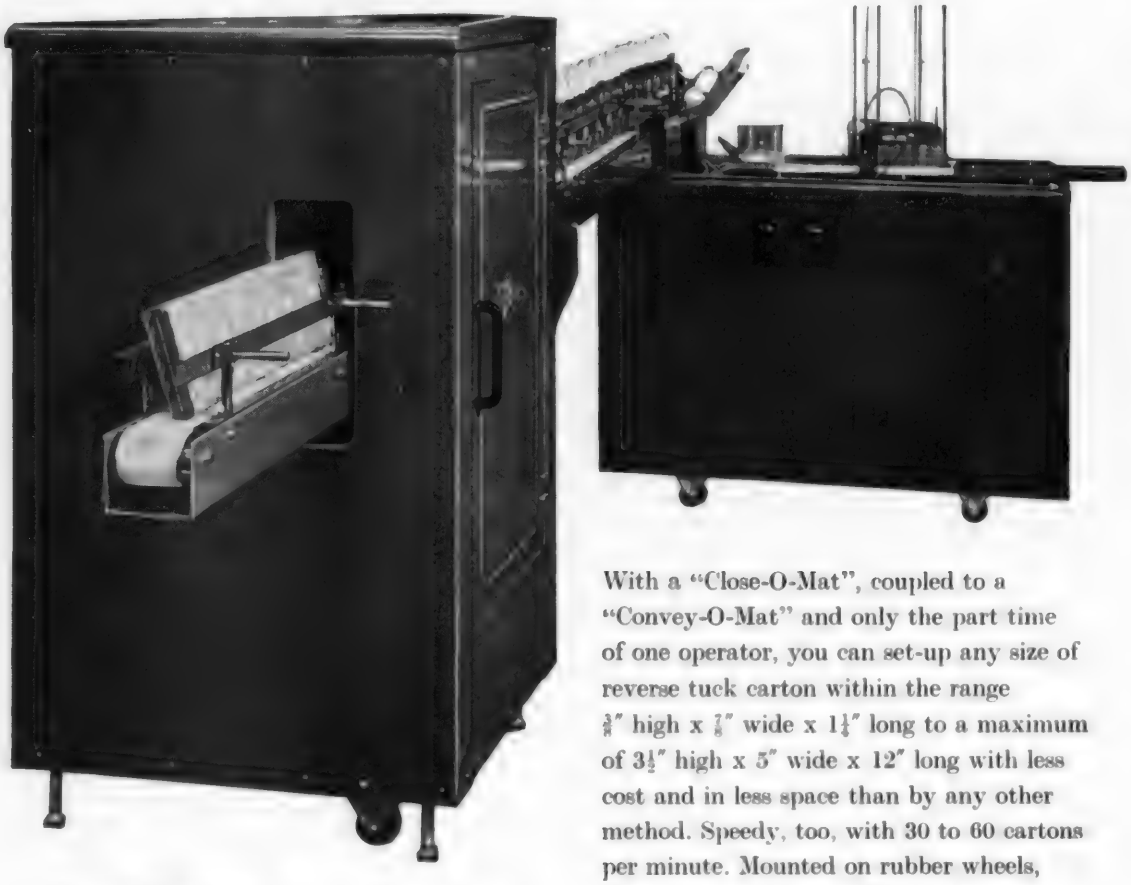

With a "Close-O-Mat", coupled to a "Convey-O-Mat" and only the part time of one operator, you can set-up any size of reverse tuck carton within the range $\frac{3}{8}$" high x $\frac{7}{8}$" wide x $1\frac{1}{4}$" long to a maximum of $3\frac{1}{2}$" high x 5" wide x 12" long with less cost and in less space than by any other method. Speedy, too, with 30 to 60 cartons per minute. Mounted on rubber wheels, the unit is easily moved by one person. Built to the very highest standards for the very highest performance.

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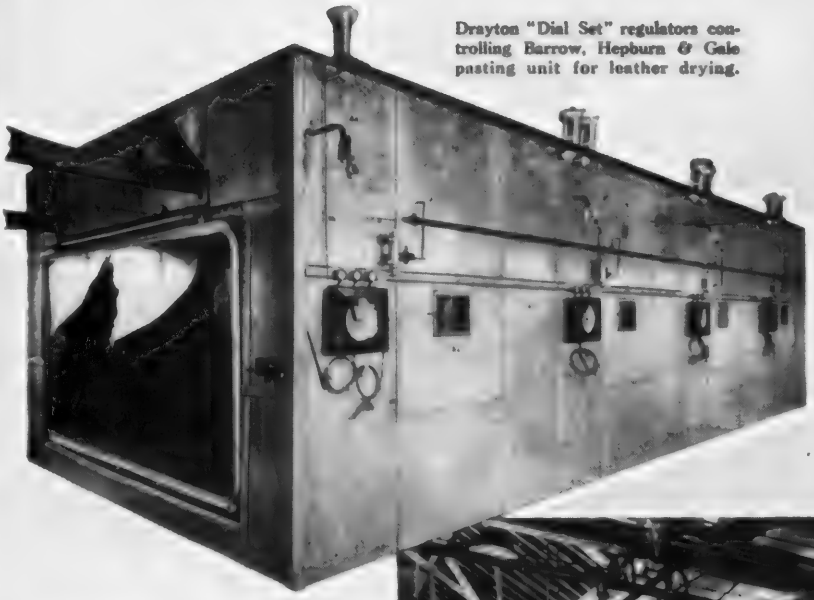

Drayton "Dial Set" regulators controlling Barrow, Hepburn & Gale pasting unit for leather drying.

..."with the many new and complicated processes of today and the need for greater output, greater accuracy, greater economy in manpower and of materials... the use of instrumentation and automatic control is of fundamental importance."

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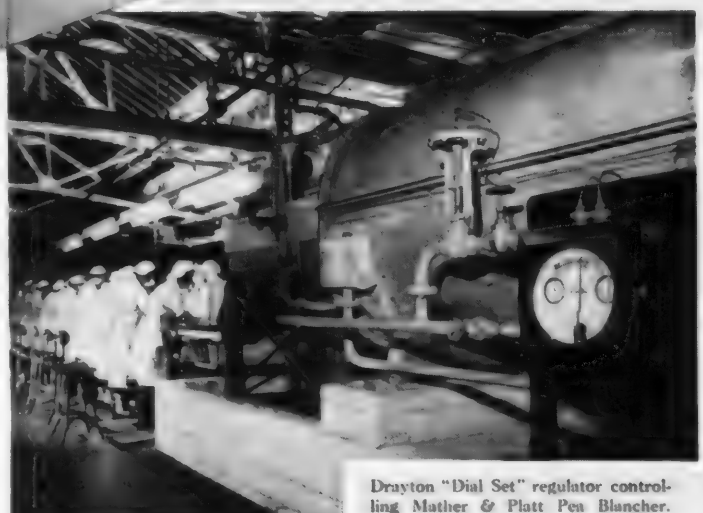
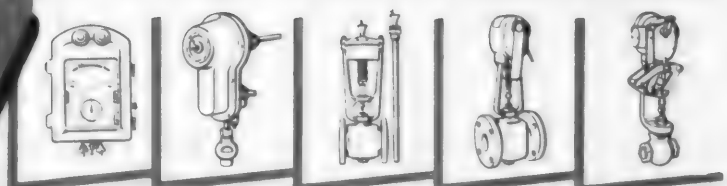


Drayton "Dial Set" regulator controlling Mather & Platt Pen Blancher.

DRAYTON Controls



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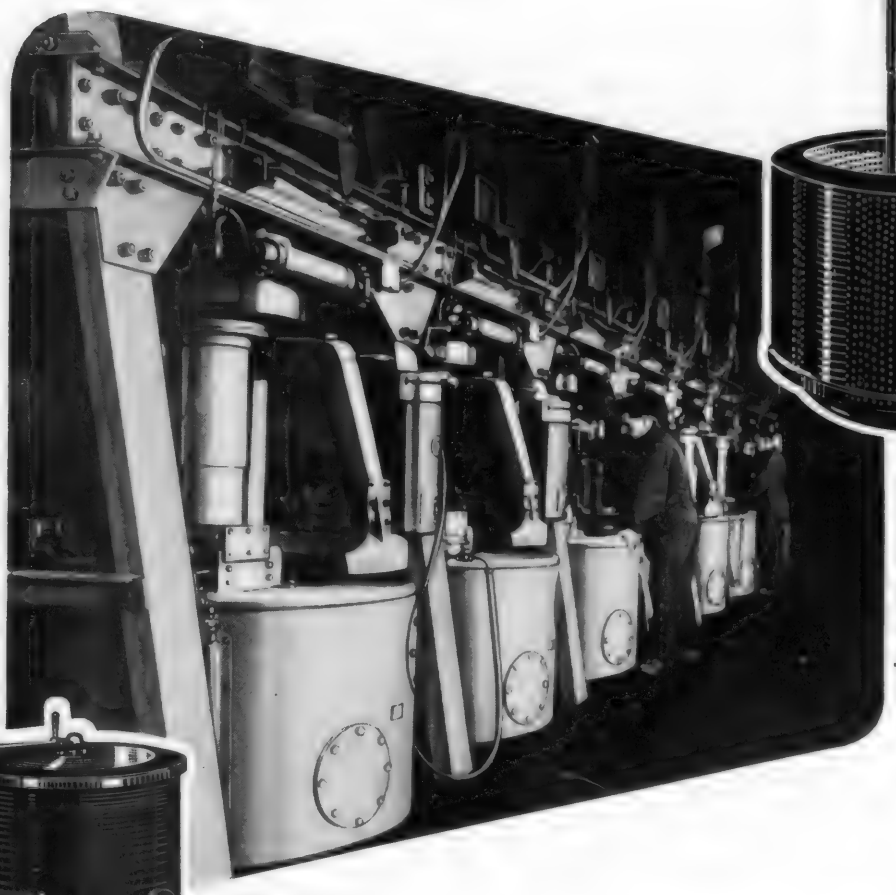

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tube packaging experts
to solve your
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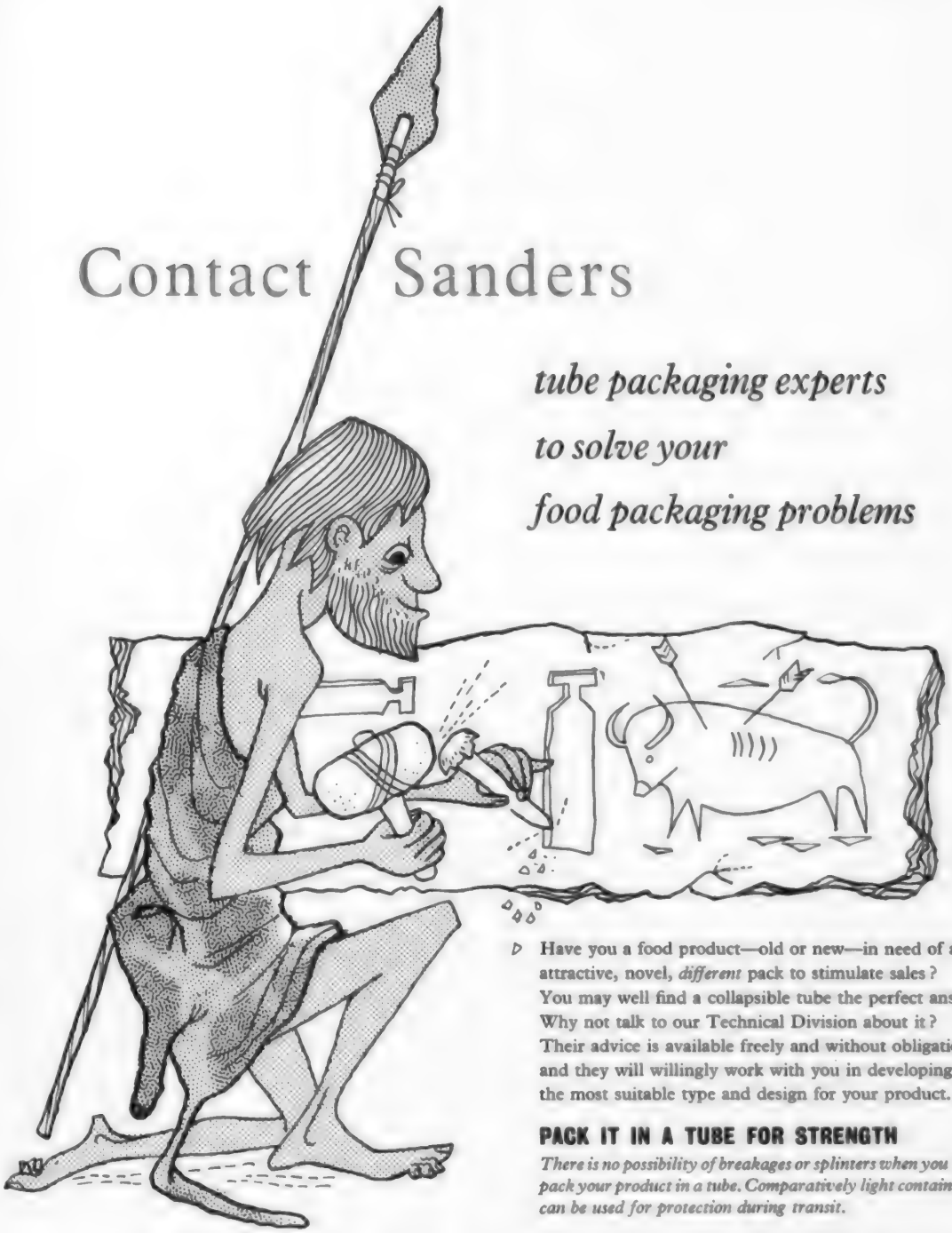

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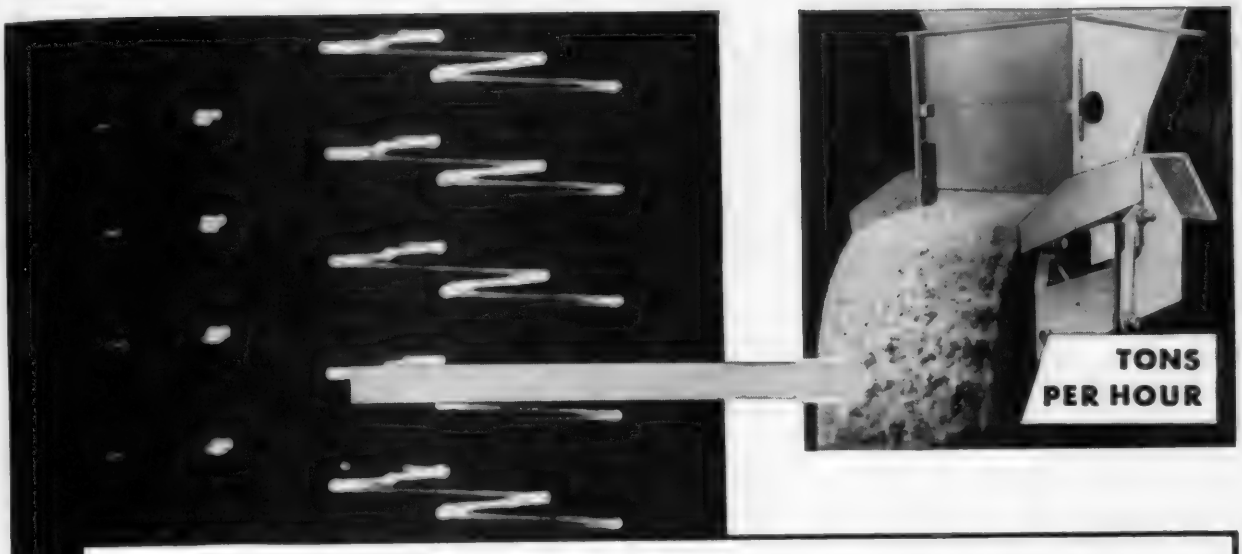

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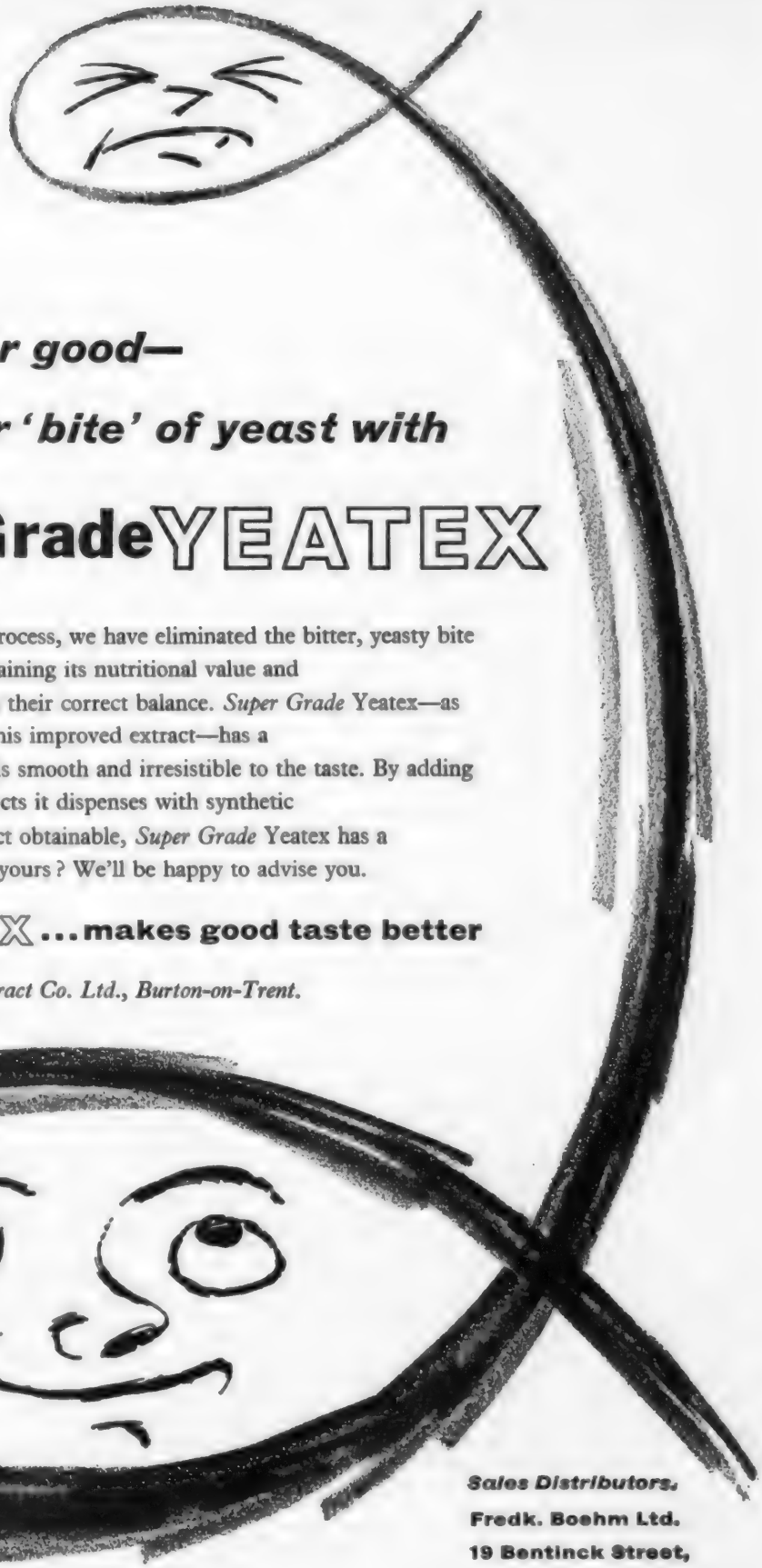

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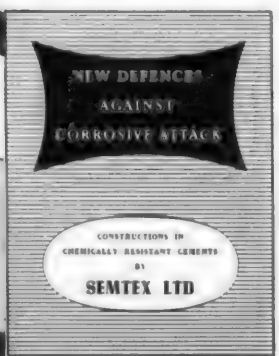

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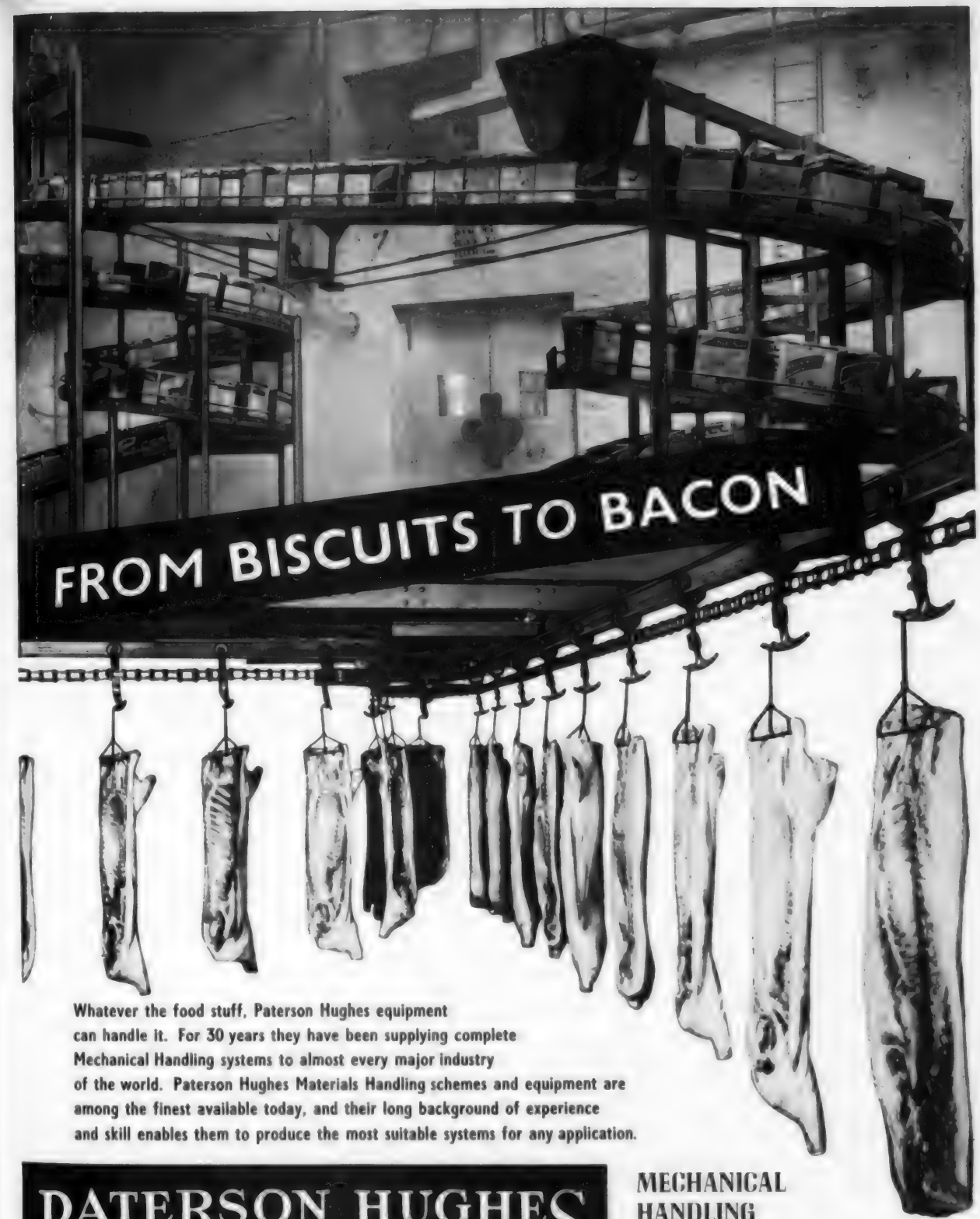

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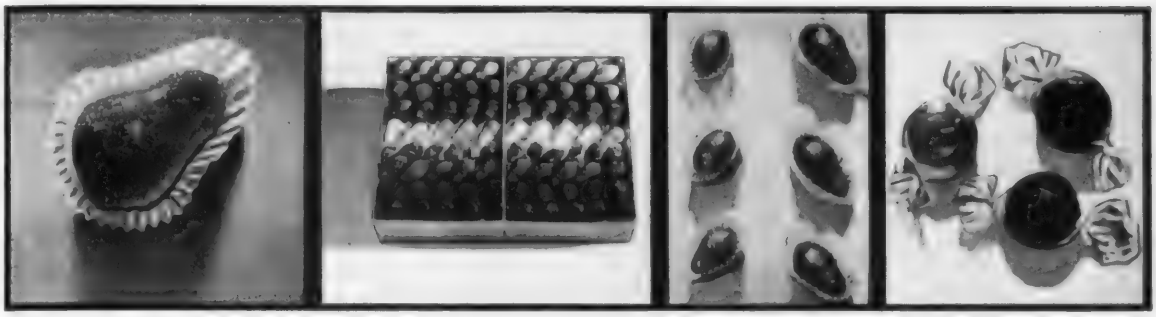

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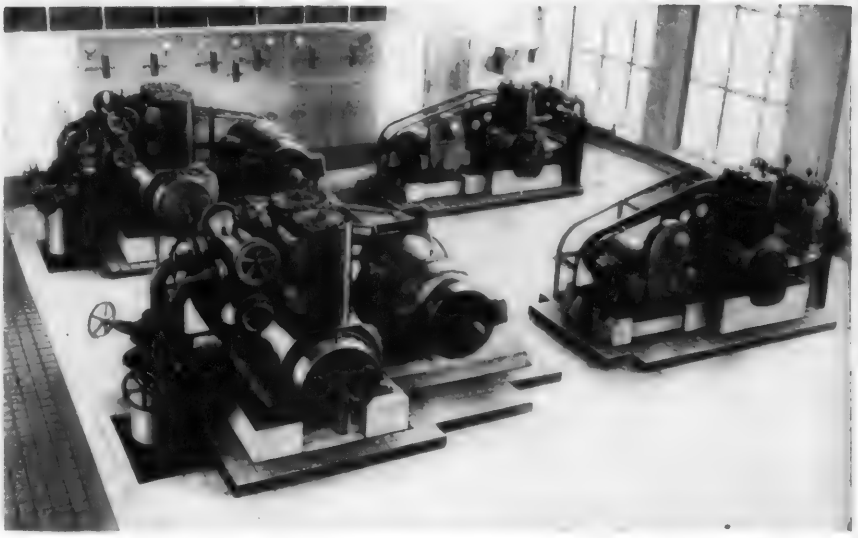

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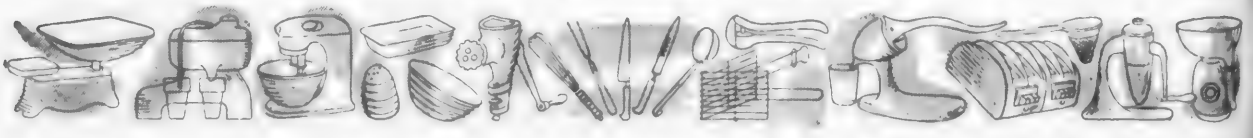

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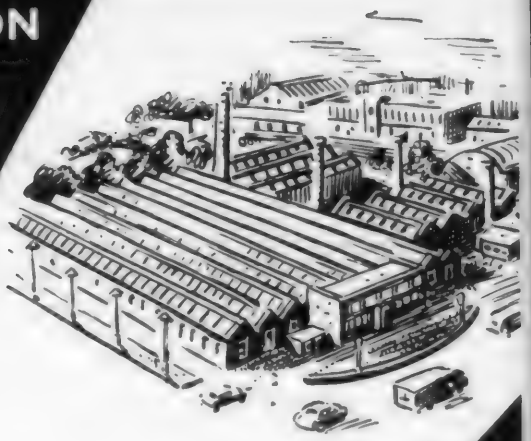

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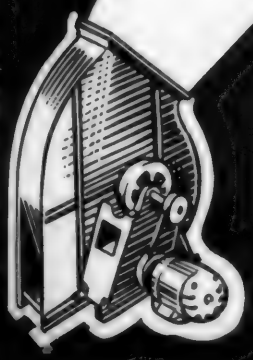

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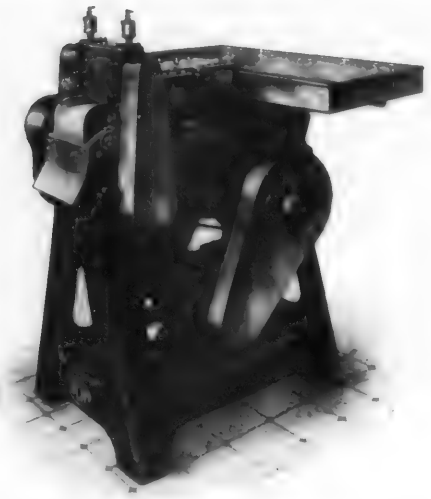

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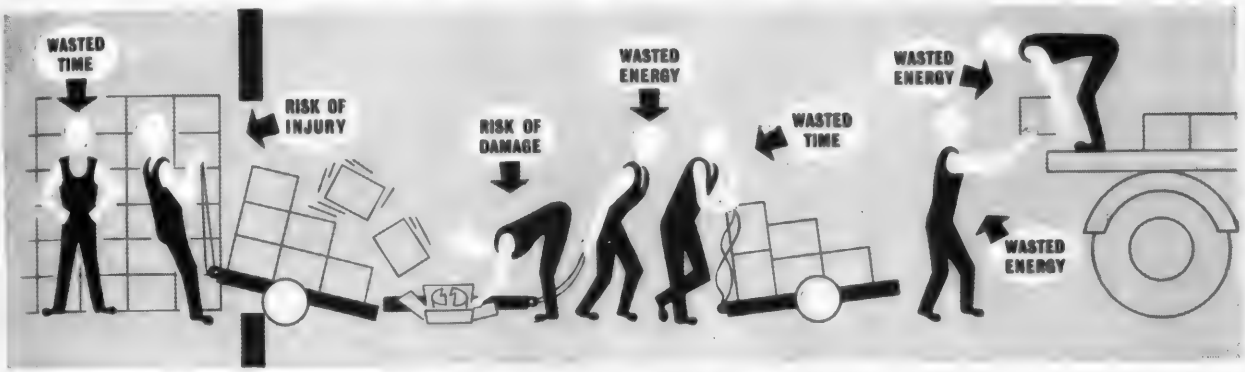

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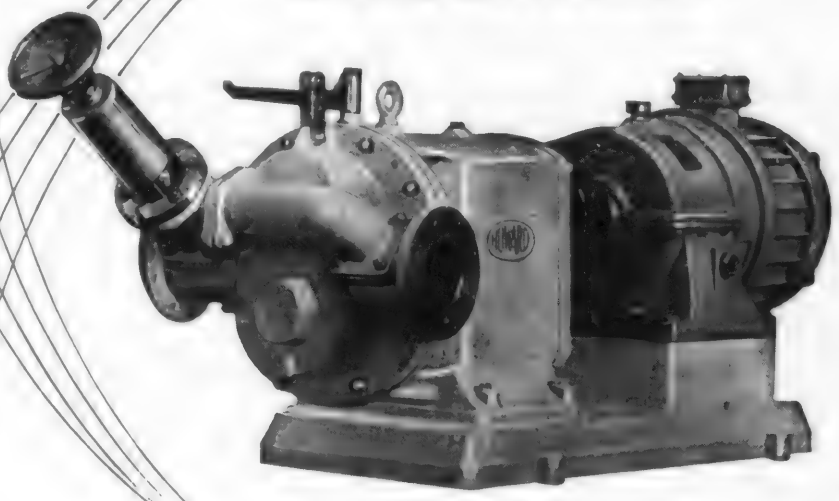

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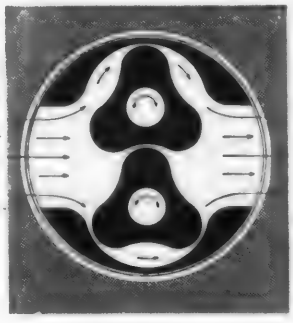

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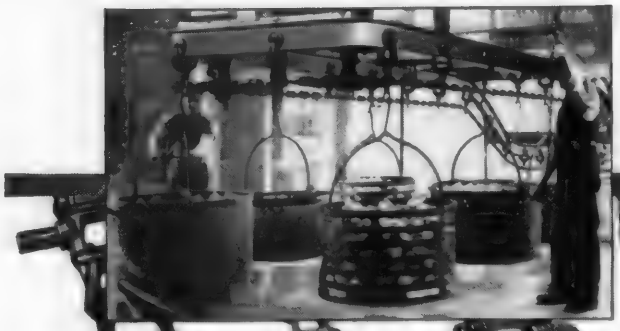

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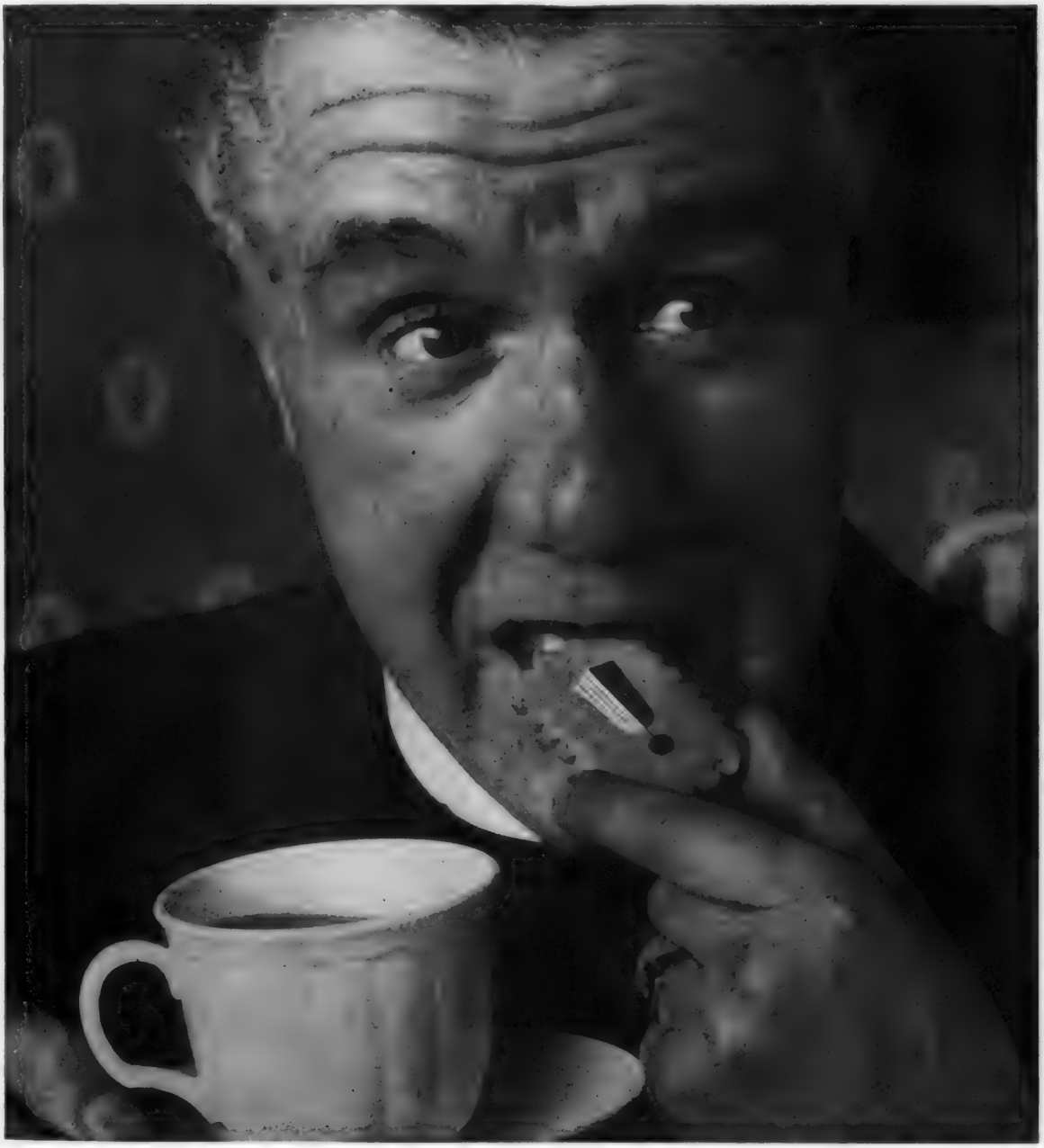

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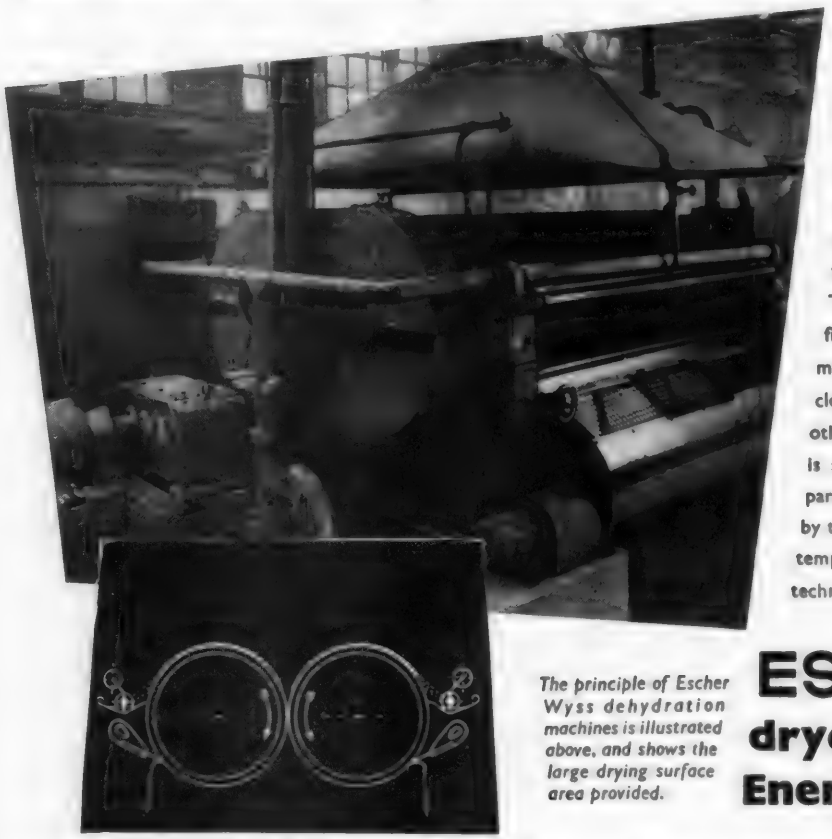

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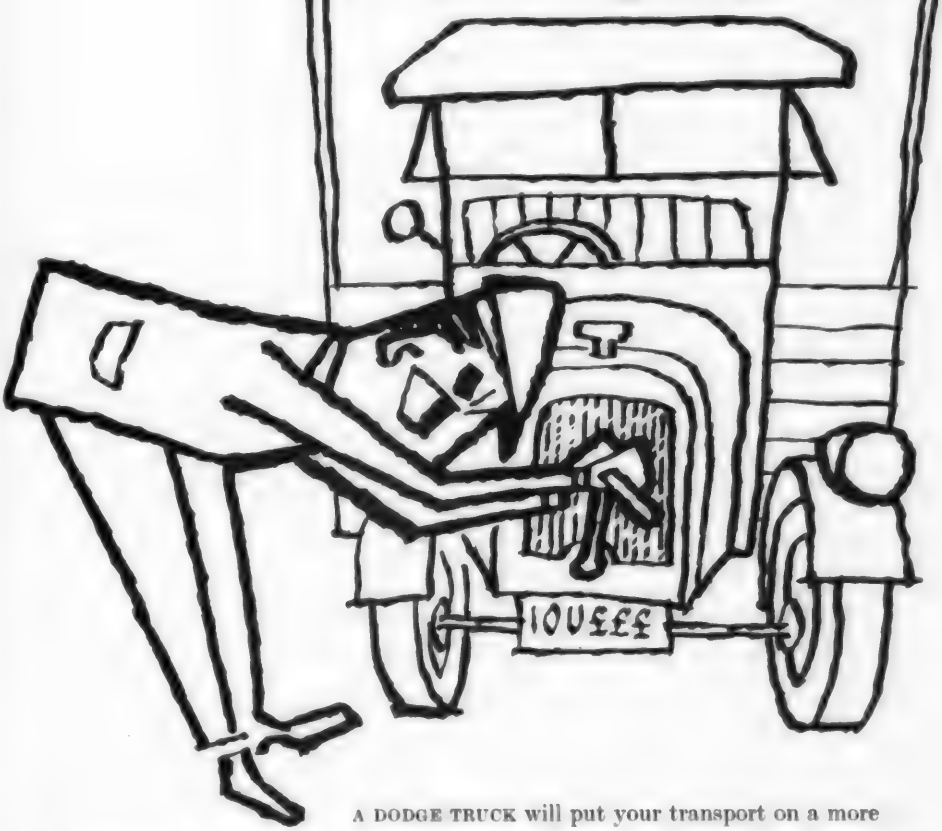

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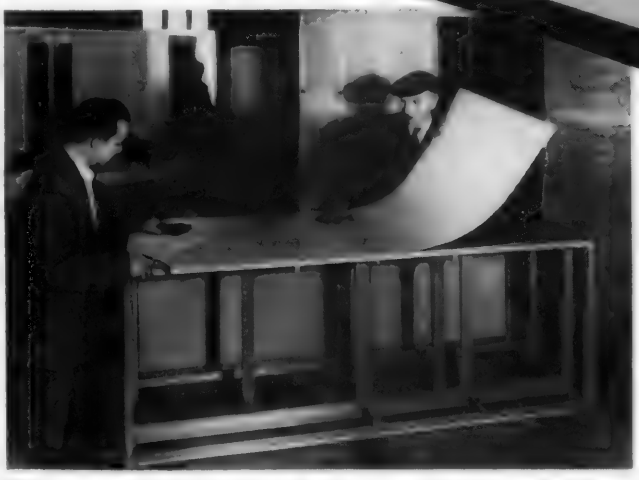

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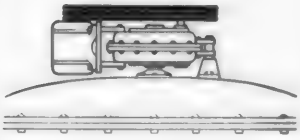

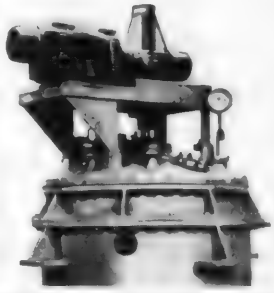

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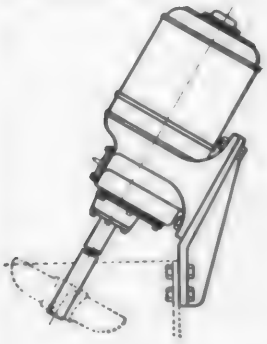

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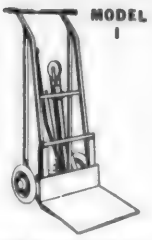

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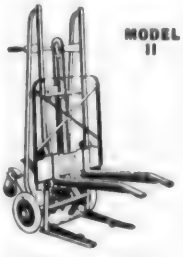

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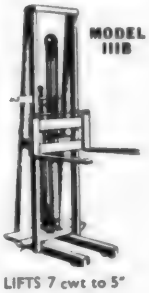

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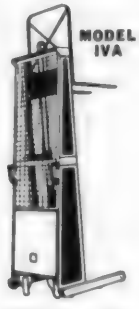

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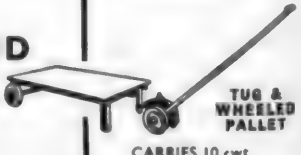

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FOOD MANUFACTURE

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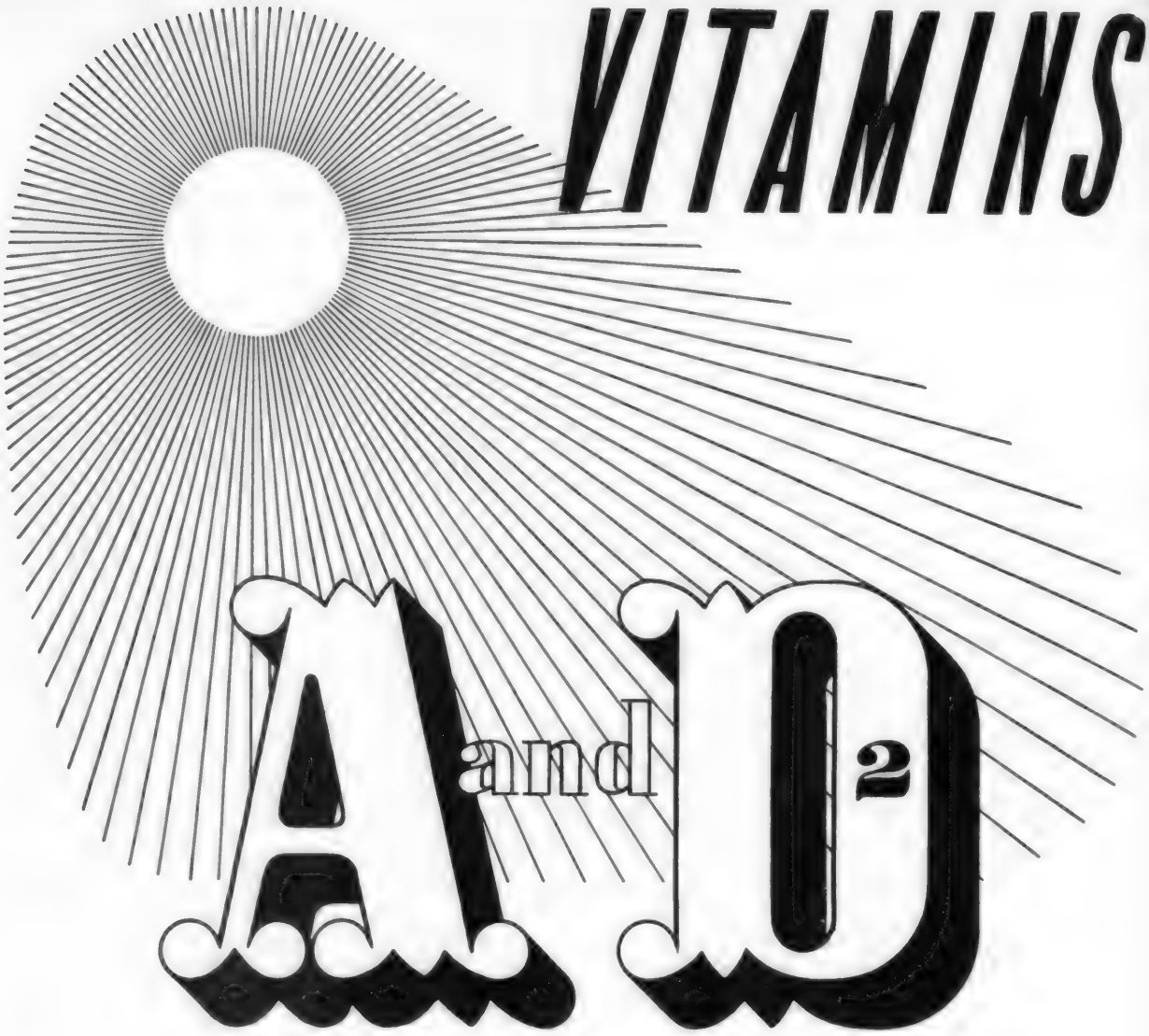

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FOOD MANUFACTURE

Vol. XXXII, No. 5 May 1, 1957

Goods on the move

DURING the last 15 years or so the study of materials handling has become a distinct branch of engineering. Properly designed handling techniques reduce accidents, damage to stock, time and costs, and promote the efficient movement and control of goods. The special problems of the food industry—the perishability of many foods, the bulk storage and movement of large quantities of raw materials, the rigid demands of hygiene, and the mass-production of relatively low-priced articles—make it imperative to keep under constant review the relative efficiency and economy of handling methods. Pedantic definitions of materials handling or mechanical handling are available, but the fact remains that any time anything is moved in a factory, this is materials handling. Furthermore, as soon as goods are handled, something is added to their cost, but nothing to their value. The object of scientific handling is to keep costs as low as possible.

In this issue we present some of the ways in which this might be done. The general principles of factory layout and materials handling are discussed by J. M. Beskine. Equipment from the simplest gravity conveyors to complex powered plant, and the economies that it can effect in simplifying and accelerating production is reviewed and illustrated. Other articles deal with the application of electronic methods to mechanical handling, and the application of special techniques.

Big horizons for frozen foods

THE "minor revolution" in family catering promised by Mr. Wallace Smedley when he announced his company's intention to increase their output of quick frozen foods (see FOOD MANUFACTURE, March, p. 129), was no exaggeration. There seems practically no limit to the scope of frozen foods, and many processors look forward to the day when they rival the canning industry.

The four largest frozen foods processors—Lyons, Birds Eye, Smedleys and Ross Industries all plan big increases in their production, and there seems to be little doubt that the output of these goods will be nearly doubled this year.

The main difficulties are to overcome the consumer's resistance to higher prices of frozen foods and to persuade more retailers to invest in the deep-freeze cabinets required. Objections to higher prices may gradually dwindle as housewives realise that frozen foods eliminate much of the waste incurred in market-bought produce, together with savings in cooking time and fuel, dishwashing and other drudgery. More retailers are buying deep-freeze cabinets, and there are already about 20,000 retail outlets in the country. One manufacturer, John Connell, who makes *Superfrost* quick frozen meat packs, envisages selling his products from every shop whose owner can afford a down payment on a frozen food cabinet; not only fishmongers, green-grocers and grocers, but multiple shops, newsagents and tobacconists' shops, and of course, from coin-operated slot machines on railway stations, etc. He is now trying to encourage London public house landlords to instal deep-freeze cabinets and infra-red grills so that he can supply them with quick-frozen steaks for sandwiches, etc.

If the industry's plans turn out as expected, a vast business in frozen foods, on the American model, can be foreseen in a few years.

Dangers of over-feeding

INTRODUCING children to new, more nutritious, foods has its dangers. Although Britain can be proud of her child welfare schemes, the consequent rapid growth of children may actually shorten their lives, according to Dr. Hugh Sinclair, vice-president of Magdalen College, Oxford. Speaking at a World Health Day meeting at London University Senate last month, Dr. Sinclair warned that over-feeding may also shorten the period of growth and development so that adult size is reached earlier. It also shortens life, he said.

Milk, cod-liver oil and orange juice did not escape Dr. Sinclair's criticism. "There are serious defects in cows' milk as a food for infants, and national dried milk has even more serious effects," he said. "Orange juice is not the ideal vehicle for vitamin C and cod-liver oil is very far from being the best vehicle for vitamins A and D."

Dr. Sinclair's warnings are not new. Serious doubts upon the nutritional soundness of the national welfare foods programme were reported in FOOD MANUFACTURE in December, 1955 (p. 483), following the report of the team led by Dr. W. T. C. Berry of the Ministry of Health which showed that some children were actually receiving too much vitamin D. More than a year before this Ministry of Health experts had showed that welfare orange juice, issued to supply extra vitamin C was, in fact, merely a pleasant drink.

Dr. Sinclair pointed out that a little research costing a few thousand pounds would probably have established that welfare orange juice is not required by children over two years and have saved the country £7½ million over the past 15 years. Observing that we are still ignorant of what constitutes the right food, Dr. Sinclair suggested that an annual expenditure on research of a hundredth part of the £15 million spent each year on welfare foods might save millions of pounds. The need for a courageous Government to overhaul the welfare schemes grows increasingly urgent.

Chacun à son goût

EVERYBODY is amused by his neighbour's tastes in food. Haggis, raw herrings, snails, frogs, bird's nest soup and succulent beetles, and the enjoyment they give their respective consumers, never fail to provoke reactions varying from mirth to disgust in people whose tastes may be equally strange.

The study of these fads and fancies has more than a curiosity value. Apart from the widening scope of commercial food distribution throughout the world, which is still largely potential, there is the nearer problem of helping those in nutritional danger, from famine, etc., often against their wills.

An interesting analysis of some historical, social and individual factors in the formation of dietary habits has been made by the American anthropologist, Dr. Margaret Mead, on behalf of the World Health Organisation. The cheerful appetite of small children for stones, pieces of glass, nails and other oddities, as well as edible objects, is well known, but children have to learn to eat the food of their society. Any people who have lived for several generations in a given place have established a pattern of food sufficient to maintain the lives of at least some of their members. The depressing truth is that those who are limited by nature to a poor, precarious diet are those least likely to want to change it. Often the diet may be much more deficient in vitamins or proteins than it need be because the people do not regard, for example, goat or sheep milk, or rose hips, or certain kinds of grubs or small rodents, all available in their neighbourhood, as "fit to eat."

Dr. Mead suggests that where a people have very poor food resources and each generation adheres to a fairly narrow pattern, any new foods introduced should conform to this pattern. Thus, a rice-eating people who are short of rice may learn to cut sweet potatoes into very small pieces and dry them, or to toss maize meal until tiny balls are formed. Conversely, where many varied and nutritionally rich foods are available it is advantageous to develop in children a welcoming and experimental attitude towards all food within a wider pattern.

Food manufacturers might profitably try to cultivate fresh tastes in Britain, where every salesman can tell tales of varying preferences in different parts of his territory. One hears of Cheshire folk preferring Lancashire cheese while Cheddar and Cheshire cheeses are much enjoyed in Lancashire. Northerners are said to prefer pale-coloured butter, preferably dug out of a cask, while in the South butter must be yellow and properly wrapped. Canned tomatoes sell much more easily in the Midlands than anywhere else, and there are quite distinct methods of cutting up pigs to suit the different tastes of the North and South of England.

Life would be dull without these irrational predilections, but many of them would not seriously be missed—certainly not by food manufacturers, wholesalers and retailers, whose costs and labour would be materially less.

Too much milk

IN SPITE of the exhortations of Miss Zoe Newton to drink more milk the public is responding too slowly to prevent a surplus whose size is becoming critical. It is expected that the 1957-58 production will be 200 million gallons more than last year.

At Doncaster recently farmers were buying cows in milk at £60, keeping them for a short time and then selling them for slaughter. According to a former branch president of the N.F.U. milk production has reached such a pitch that prices for dairy cattle have fallen and they can be turned into beef at a profit.

Increasing milk production is worrying many producers—prices for milk to be used in manufacturing are likely to be 1½d. to 2d. a gal. lower. The Milk Marketing Board would have lost some £10½ million if they paid for milk at published prices so that cuts have been made every month since December.

However, these are short-term policies. In the long run the M.M.B. will have to swing production from the high-cost winter months to the summer as quickly as the manufacturing capacity will allow. This is bound to interfere with the breeding pattern of the national dairy herd, but on the other hand it seems that even more emphasis will be paid to quality than before.

Copper and apple juice

THE quality problems of apple juice production have long been recognised as formidable. Clouding and sedimentation after pasteurisation and bottling is one of the most troublesome. It has been relieved by the use of clarifying enzymes, but only in so far as the clouding or deposition involves precipitations of pectinuous matter. For precipitations involving degraded tannins, preventative measures have not been developed, and this kind of spoilage has continued to occur at random. Now a most hopeful contribution has come from Long Ashton Research Station, where the Fruit Products section has been investigating apple juice problems for many years. A new paper (M. E. Kieser, A. Pollard, C. F. Timberlake, *Journal Sci. Food and Agric.*, 1957, **8**, 151) shows that traces of copper may often be the causative agent.

In preliminary experimental work studying the nature of sediments, it became known that juices had been contaminated with copper and zinc, one juice to the extent of 6·6 p.p.m. of copper. The storage deposit from this particular juice gave an ash containing 60% of copper but only traces of zinc. Other juice deposits were then tested for copper, and the consistent presence of this element suggested that it may exercise some function in sedimentation. This was followed by sets of experiments with juices to which traces of copper (*e.g.* from 0·5 to 13 p.p.m.) were added as copper sulphate. An apparently conclusive pattern for the copper-and-sedimentation relationship emerged. Juices with added copper produced more sediment during storage; and with juices containing increasing amounts of added copper, the sedimentation was generally greater for higher copper content. Additions of other metallic elements were also tested—aluminium, zinc, iron, cobalt, nickel, tin, and lead—but except for tin no evidence of selective accumulation of these other metals in deposits was obtained. Copper, also present in all these tests, remained the major metallic constituent in storage deposits, though with tin present some tin seemed to have replaced copper partly.

The conclusion was therefore reached that copper acts as a catalysing agent for the oxidation and condensation of phenolic substances in apple juice. To state this briefly here does little justice to other aspects of the research reported in the Long Ashton paper, which deal with the complex nature of the phenolic substances and the reactions causing their degradation and deposition, but the linking of these effects with copper is of major practical importance. The penultimate sentence of the paper may be quoted: "The avoidance of copper contamination at all stages of apple juice manufacture would seem to be especially necessary." Not for the first time in fruit juice processing is copper placed in the dock; traces of copper have been shown to catalyse vitamin C degradation in blackcurrant juice production. Contamination with copper occurs through the use of copper or copper alloys in corrosion-resistant storage vessels or parts of such vessels, *e.g.* taps. It would seem much less likely to occur through residues from pesticide sprays used in apple growing; copper-based fungicides are seldom used for this crop.

Algæ won't stock the world's larder

ANOTHER blow to the dream of obtaining large regular supplies of protein by cultivating algæ in tanks has been struck by two American industrial scientists. They support the arguments put forward by Dr. Norman W. Pirie of Rothamsted (FOOD MANUFACTURE, January, 1956, p. 2) and Dr. Hugh Nicol (FOOD MANUFACTURE, July, 1956, p. 285). In a nutshell, their contention is that even under extremely favourable circumstances, algæ would cost more to produce than many conventional food crops.

Large-scale cultivation of such algæ as *Chlorella* has frequently been proposed as a means of averting famine in such countries as India, where production of food has failed to keep pace with population growth. Among the advantages cited for *Chlorella* is the fact that the ratio of fats and proteins in this organism can be controlled to some extent by altering the culture medium in which it is grown.

The chemical engineers, Dean R. Thacker and Harold Babcock, based their pessimistic conclusions in part upon actual production experience in a pilot plant built in New York by Chas. Pfizer and Co., Inc., which has had more than three decades of experience in the production of chemicals by fermentation. Like the breeding of *Chlorella* algæ, fermentation involves the care and feeding of huge tankfuls of micro-organisms.

Unfortunately, algæ do not grow fast. The best yield obtained by the two scientists was 13 g. of dry algæ per litre of culture fluid after a 12-day run. In comparison, normal industrial mould cultivation produces up to 50 g. of mould per litre in five days.

Many other considerations, such as regulation of light and temperature, the supply of suitable raw materials, and the processing of the end-product conspire to increase the cost of *Chlorella* culture.

To operate a hypothetical algæ-producing installation envisioned by the Pfizer engineers—turning out the product at a rate approximately four times as large as any experimenter has yet achieved on a practicable scale—a commercial firm would have to spend approximately 8 times as much for every pound of algæ produced, Thacker and Babcock note, as the current world market price for whole ground soya beans.

Nevertheless, they point out, there are three cir-

cumstances which might make the mass culture of algæ a practical reality:

(1) Increase in world population so great as to make new sources of food mandatory regardless of cost;

(2) A major research "break through"—either in radically different culturing equipment, or in species of algæ easier to culture than presently known types;

(3) Discovery of some valuable use for algæ in addition to their use as a source of food.

Messrs. Thacker and Babcock's paper appeared in the first issue of the new *Journal of Solar Energy, Science and Engineering*, published by the Association for the Advancement of Solar Science.

Skuse's complete confectioner

A MINOR mystery of food literature is whether any copies still remain of the first or second editions of *Skuse's Complete Confectioner*. Interest in this question is revived by the impending publication by W. J. Bush and Co., Ltd., of the thirteenth edition of "Skuse," the last having appeared nearly 30 years ago.

Mr. R. G. Sanderson of W. J. Bush tells us that his investigations into the origins of this "bible" of the sugar confectioner show that the first edition was published by E. Skuse in about 1880. It was called *The Confectioners' Hand Book*, and was printed by Hunt and Co., Church Street, Edgware Road, London. It consisted of 32 pages. It must have been a great success because a second edition of 51 pages was published in the same year. This was followed by an edition of 182 pages in 1881, and a fourth edition of 184 pages in 1883. These editions contained information and recipes on sugar confectionery and also on ice cream, crystallised fruits, candied peel, pastry, cordials and syrups for beverages, aerated waters and fermented beers.

W. J. Bush have not seen a copy of the first edition. In fact, the earliest so far discovered has been the third edition, which is in the British Museum Library. The Museum has a record of the fact that the second and fifth editions were destroyed during the war.

It is thought that it was the fifth edition, consisting of 187 pages and published in 1894, which first introduced the name of W. J. Bush. It was with this edition that the present title was used. The only editions after the fifth which Bush have so far been able to trace are the tenth, for which there is no date available, the eleventh, published in 1922, and, of course, the last one which came out in 1928.

If any of our readers have information on these missing editions W. J. Bush would be pleased to hear from them.

The new edition has been completely revised and includes a new chapter on raw materials. All the recipes have been revised and fully tested in Bush's own experimental confectioner's shop. It will consist of over 300 pages, fully illustrated.

Yeatman's hundred years

THE centenary of a company which began with a staff of 12, one hand-barrow and a hired horse-drawn van is being celebrated this month. Today the Yeatman Production Group, makers of *Sunny Spread* and other groceries, and of *Selesta* and *Goodies* confectionery, has just under 600 employees, a fleet of lorries and an established export trade for more than two dozen lines in 48 countries, as well as a thriving home market. The company has opened a new centenary wing at their Cherry Tree Works at Watford, while the net profit last year rose from £53,561 to £67,919. Besides the 25% dividend a 6¼% centenary bonus has been paid.

It is particularly sad that in the midst of these celebrations the chairman, Mr. A. E. Mortimer Woolf, should have died.

Mr. Woolf, who was a surgeon by profession, had been chairman for 20 years and always took a special interest in the health of employees, by whom he was affectionately called "Mr. Teddy."

Mr. Woolf was one of the family which has controlled the firm throughout its history. He was a grandson of the founder, Edward Woolf, who began his business—the manufacture of yeast powder—at 119, New Bond Street, in 1857. Another grandson of the founder, Mr. Frank A. Woolf, is managing director, and Mr. Robin A. Woolf, a great grandson, is technical director.

The group comprises Yeatman and Co., Ltd., which became a public company in 1898 after 40 years of private trading; a subsidiary in South Africa and Goodies, Ltd., formed in 1929 by Yeatmans for the mass-production of confectionery. Baker and Witt, Ltd., printers and box-makers, were acquired during the war to handle all packaging. The Group moved to Watford in 1952 from temporary premises at Southfields, after most of the original factories and offices in East London had been bombed.

An odd fact is that nobody knows how the name "Yeatman" came to be chosen. None of the existing records provide an explanation. It is thought to have derived from the original yeast powder product.

Next month FOOD MANUFACTURE *will turn its spotlight on the canning industry. Articles will include a description of the canning of pilchards, a discussion of the bacteriology of canned fish, a review of the latest progress in meat canning and a special staff survey of equipment available for the canner.*

CAKE MIXES

Mass production at Nabisco Foods, Welwyn Garden City, demands rigid quality control and split second process timing. By 1960 the British cake mix market is expected to be worth £10 million a year.

"THIS is a coats off operation," declared the chairman of the Shredded Wheat Co., Ltd., when his company entered the cake mix business two years ago, and his words effectively expressed the dynamic nature of the company's new policy. For nearly 30 years the Shredded Wheat Co.'s sole product was its famous breakfast cereal. Since 1953 the company has launched seven new products and has changed its name to Nabisco Foods, Ltd., to mark its widening scope. The company's factory at Welwyn Garden City—a well-known landmark because of its towering white 12,500-ton capacity grain silos—is currently being extended by over 100,000 sq. ft. to cope with increasing production and to provide greater facilities for research and development.

The success of Nabisco's Cake Mix Division since they entered the market in 1955 is apparent from the fact that the three original lines in their *Mary Baker* range (golden mix, ginger bread and "Devil's Food") are leading the field, selling substantially more than any other brand in all social groups and in all but one age group (the 45-64 group in which a competitor led by 1%). Moreover, the fieldwork for the survey* from which these figures are taken was carried out before the company launched Britain's first fruit cake mix since when, they claim, sales have considerably increased. Much more recently Nabisco have launched a fifth product in the *Mary Baker* range, a sponge cake mix for which they report: "Orders are pouring in at a fantastic rate."

Above left: **Operating the mixing control panel. All batches are pneumatically conveyed to the mixing and packaging machines.** *Right:* **Weighing and mixing the cake mix ingredients.**

The size and importance of the cake mix business can be judged from the money spent in advertising it. *Mary Baker* entered the market with a six figure advertising appropriation for its first six months. In 1956 the leading cake mix manufacturers spent £351,747 on advertising in newspapers and periodicals, of which the expenditure on *Mary Baker* products (consistently the largest advertiser) was £101,859. When the company first burst into the cake mix business $135 million had just been spent in one year in America on 350 million packets of cake mix. The market, which has only been in existence in this country for about three years, was estimated then to be worth £2 million a year and is expected to rise to £10 million a year by 1960.

Cake mixes are typical of the "convenience foods" offered to the housewife during the past decade in that all she has to do is to follow simple instructions, adding only water and where necessary eggs, to produce cakes of a uniform and standard quality. However, although this application of mass production to home cooking has flourished only since the war, prepared cake mixes as such are almost as old as *Shredded Wheat*. The first of them appears to be a cake doughnut mix offered to American bakers in the early 1920's. Prepared cake mixes continued to be sold with some success to bakers throughout the thirties, and after the war gained

* *Cake and Sponge Mixtures.* Daily Herald Readers' Survey.

wide acceptance, no doubt from a desire amongst bakers to achieve more uniformity in their products and to alleviate some of their labour difficulties. Consumer cake mixes were a logical development of these products.

Generally speaking, prepared cake mixes are made with the same products used by the quality baker or the successful housewife, with the exception of eggs and liquid sugars. The secret lies in the carefully selected recipes, the strictest quality control of all ingredients and meticulous attention to weighing and blending processes. The question of incorporating eggs into a cake mix has been a matter of some controversy, but Nabisco's findings on the matter when they carried out preliminary surveys before launching the *Mary Baker* range (which require the addition of a fresh egg) seem to be conclusive. They found that 95% of all the women they interviewed preferred to add an egg when using a mix and this tallied with similar experiences in America.

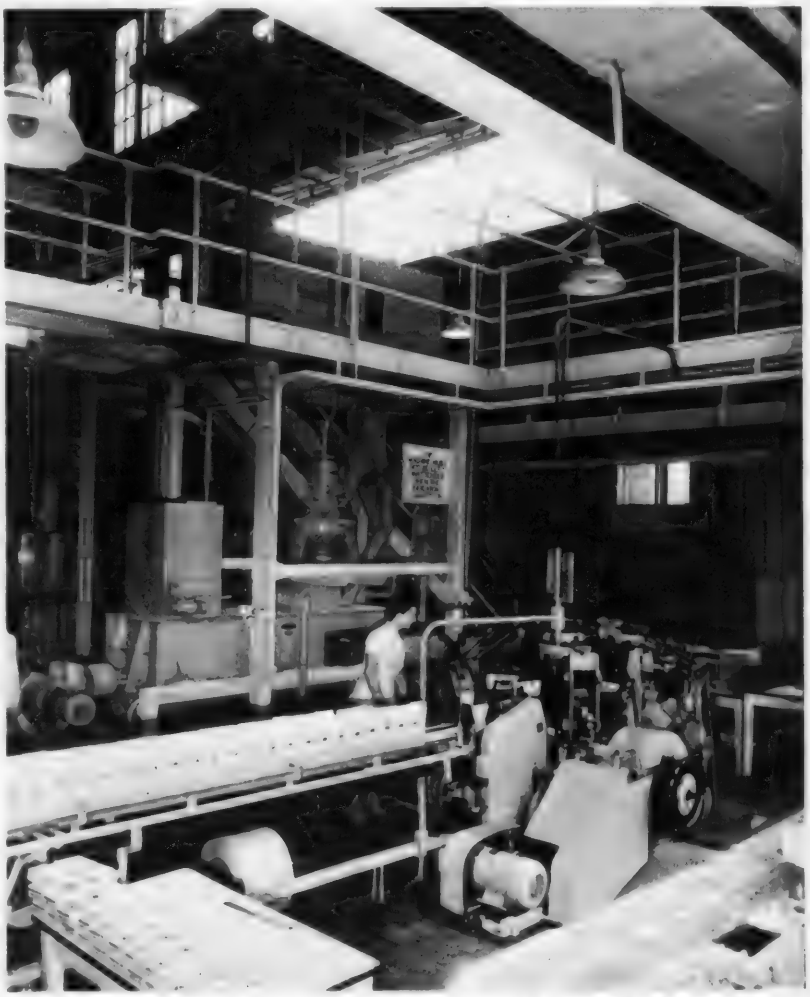
The all-important factor in cake mix manufacture is quality control and Nabisco, whose expenditure on cake mix production has already been remarked, spare no expense to ensure that their new products reach the same standards of purity and uniformity for which *Shredded Wheat* is famous.

Laboratory control at Nabisco's Cake Mix Division starts as soon as the raw ingredients arrive at the factory. Very strict specifications are laid down for suppliers to follow, and all ingredients are examined and test baked by the laboratory staff before delivery is accepted. Periodical tests are carried out during manufacture, and no batch may be shipped until it has been passed by the laboratory staff.

Mixing

The production of Nabisco's cake mixes is a batch process. The required quantities for a day's production are conveyed to the mixing-room by fork lift truck and allowed to stay there overnight. Temperature and humidity are controlled in this room as conditioning is a very important feature of cake mix manufacture. The flour, sugar, milk powder and flavouring materials (only natural flavourings are used) are weighed and emptied into a conveying hopper fitted with a *Dustmaster* filter. The "criticals" (ingredients used in smaller quantities, such as flavourings) are weighed separately from the rest of the ingredients, as it is essential that these materials are effectively blended with the larger quantities to ensure thorough mixing. Situated next to the conveying hopper in the mixing-room is an electrical control panel governing all the machines in the mixing and packaging line. The compressor for the pneumatic conveying system is also controlled through this panel.

Pneumatic conveying is used throughout the mixing of the ingredients for hygienic reasons and because of its economy. There are no bucket or screw elevators to be cleaned and consequently little risk of mould formation, and no operators are needed for this handling system. The ingredients are blown from the mixing-room to the mixers, but first they are pumped into a cyclone to disperse the air contained between the particles, dropped through an air seal and into a *Duo-Sifter*. Magnetic separators are installed at various points in this system. The *Duo-Sifter* is essentially a screen with a circular action which carries small rubber brushes which help to rub the material through the screen. Foreign matter and coarse, unbroken particles of sugar, etc., are excluded at this stage. As a further precaution against impurities,



The package maker in operation. In the background is part of the mixing line.

Left: **The top sealing and case packing departments. All cartons bearing the top sealing unit, pass through a metal detector and are inspected before being packed in cases.** *Right:* **The final packing operation. All cases are coded, both for date and batch, before dispatch.**

the flour is passed through an *Entoleter*, designed to destroy all forms of insect life in flour and cereal products by the use of centrifugal force which violently impacts the material against cylindrical rods in the interior of the machine. These machines are part of the standard equipment of most millers, but Nabisco have installed one to exclude the most remote risk of contamination.

Having passed through these preliminary stages, the batch—now free of air and without the slightest possibility of containing any tramp iron, coarse particles or insect life—is dropped into the primary mixer situated directly under the purification system. This is a standard type ribbon mixer fitted with a dust filter. When the primary mixing has been completed, the material is passed through an air seal at the bottom of the mixer and is pneumatically conveyed to a cyclone positioned above the secondary mixer. It is at this stage that the shortening is added to the material. The time factor in secondary mixing is most important since overmixing will prevent the fat from blending properly and little balls of fat and flour will be formed. The mixing time is predetermined and subject to careful control.

The blended mix is now ready for packaging. It leaves the secondary mixer and is dropped through a vibratory screen installed under the mixer and into four filling hoppers, two on each side of the filling line.

Packaging

Most of the packaging equipment used by Nabisco is American and, at the time of writing, is not available in this country. Its function is to form and fill cartons with cake mix.

The cartons are formed on a double package maker, fed from a reel of laminated *Glassine* and with cartons on the flat. A turret in the centre of the machine is fitted with spokes in a star-wheel pattern, each spoke terminating in a block. The *Glassine* is automatically folded around this block and heat sealed. As the turret revolves, glue is applied to the inside of the carton and the flat cut-out shape is folded around the formed liner on the block, so that the full effect of the machine is to make a complete formed carton glued to a liner. The *Glassine* and cartons are folded around each block in turn as the turret revolves and the blocks are presented for forming, so that the operation is continuous.

When a batch of fruit cake mix is being made, small satchels of fruit are added to the cartons as they leave the package maker.

The cartons are conveyed under the fillers and automatically fed with a pre-determined quantity of cake mix. As they are filled they pass a check-weighing point where random samples are weighed on a shadow scale. The packs next pass through the carton closing machine. In this machine the carton flaps are opened, two folds put into the top of the liner, the flaps are folded down, glued, sealed and are passed out to travel through a compression or drying unit. This consists of parallel belts travelling in opposite directions, the top belt passing over rollers which provide the necessary pressure for the glued packs travelling forward on the bottom belt.

The packs are now conveyed over an X-ray metal detector as a final check and inserted into outer cases. The latter is the only manual operation in the whole of the packaging line. The filled cases—containing one dozen cartons of cake mix each—are conveyed through a British made sealing machine, code stamped with the number of the batch and loaded on pallets. When the batch has been completed, the laboratory selects a sample case and its contents are tested. The batch is

Part of the laboratory. Note the cakes made from random packets of cake mix, for testing before the batch is released.

not released for distribution until it has been officially approved.

Laboratory control

The attention paid by Nabisco to ensuring the quality of their products cannot be too highly stressed. The sample case from each batch is made up exactly as specified on the instructions printed on the packet and baked into cakes. When a cake has cooled, the volume is measured to ensure that it maintains the standard size, the texture and structure are analysed and the cake's eating qualities assessed by the laboratory staff and by Nabisco's consumer service branch. Only when all these tests have been carried out successfully is the batch approved and only then can it be shipped.

Even more exhaustive tests are carried out on the ingredients for the mixes. When a load arrives the laboratory staff is summoned to inspect its external condition, and damaged containers, etc., are immediately returned to the suppliers. If the packaging is in good condition, several samples are taken at random and brought back to the laboratory for testing. Standard methods of flour and shortening analysis are used, but the laboratory staff have also evolved several tests of their own. Flours are tested for their overall purity and for the evaluation of factors which will affect the cake's baking properties, *e.g.* protein content, moisture content and *p*H. Shortening and other cereal products take longer to test and are assessed according to very rigid standards set for general condition, melting point, consistency and proneness to rancidity. Unstable fats are never used.

When the preliminary tests have been successfully passed, each ingredient is test baked in its correct proportions in conjunction with control ingredients. The resulting cakes are evaluated in the way already described.

Nor do the laboratory's responsibilities end here. Samples of every batch are taken during its preparation and test baked. The laboratory also examines samples of all packs to ensure the efficiency of glueing, sealing, etc., and carries out tests on all packaging materials used.

Cake mix manufacture is essentially a simple process. However, the intense competition in this field and consequently the high standards demanded by consumers, have made it a complex industry dependent upon high quality, high production and heavy expenditure. While Nabisco fulfils these requirements there seems no reason to doubt that *Mary Baker* cake mixes will continue to lead the field.

Radio Waves for Fruit Juice Concentrates

FRUIT juice concentration by dielectric heating has been proposed by University of Texas research workers (*Chem. Eng. News*, 1956, **34** (53), 6426). They found that when they applied dielectric heating to a frozen mass of ice and salt crystals the radio-frequency waves selectively melted the sample along its crystal boundaries and they were able to remove a solute containing relatively little water. They point out that radio wave melting as a means of concentrating fruit juices would have a big advantage over present methods of separating the solute from a frozen solvent.

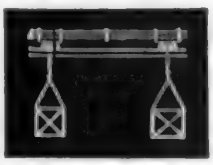
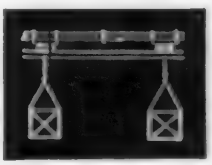
Like many other heat sensitive materials, fruit juices are hard to concentrate by the usual methods of distillation, evaporation and precipitation, particularly since they contain volatile flavour and aroma components.

The method suggested by K. A. Kobe and C. G. Heisig (now of the University of Michigan) is a two-step process. The solution is first frozen on a refrigerated drum to obtain maximum freezing rate, and secondly the concentrate is removed from the frozen solution with a centrifuge while the system is under the influence of a radio frequency current.

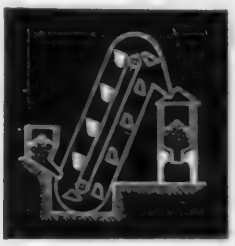
Heat generated in this way is more expensive than heat from condensing steam and the value of this process is lost unless it is applied to heat-sensitive materials. As far as fruit juices are concerned, the method is claimed to avoid losses of solute and is hoped to compete economically with high vacuum evaporation. Another advantage is that processors can take off two or more separate fractions of concentrate for reprocessing until the desired concentration is reached.

MECHANICAL HANDLING

A SPECIAL "FOOD MANUFACTURE" REVIEW

The modern food factory poses two sets of materials handling problems. On the one hand there is the trend towards handling raw materials in bulk, and on the other there is the need for highly efficient methods and equipment for moving immense quantities of small units. Speed, economy and, above all, hygiene, must be the watchwords of mechanical handling in the food industry. In the following pages we present a guide to the methods and equipment now available.



EQUIPMENT SURVEY . . .

ALL-PURPOSE TRUCKS

Almost every trucking and hoisting job in the food industry can be performed with one or another of their products, according to Yale and Towne. This firm, said to be the largest materials handling equipment manufacturer in the world, has a range of hoists for loads of up to 40 tons and a range of hand and powered trucks for loads of up to 150,000 lb.

Typical of the applications of Yale trucks are those of the pedestrian-controlled electric *Worksaver*. This range includes pallet, platform, fork lift and tractor models in capacities of up to 3 tons (low lift models) and 3,000 lb. at 24 in. load centre (fork lift models).

Another range, known as the *Warehouser*, provides for platform and fork lift models of the stand-up, rider-controlled type. The outstanding feature of the *Warehouser* is the small space it needs to work in—aisles of 5 ft. to 6 ft. are sufficiently wide to permit right-angled stacking. These trucks are faster than *Worksavers*; capacities are 2 tons (platform) and up to 3,000 lb. (fork lift).

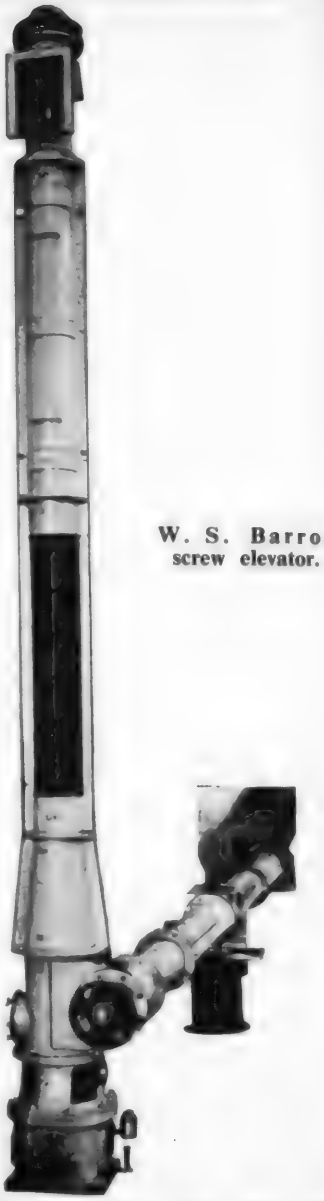
Among the latest trucks for British industry are the *Yale 51* series. These are rider-controlled electric fork trucks in capacities from 3,000 lb. to 10,000 lb. (at a 24 in. load centre), and the 10,000 lb. model is said to be the only electrically powered truck of such high capacity available in this country. Stacking height of these trucks can be as much as 120 in.

Attachments for these *Yale* trucks include hydraulic clamps, adjustable jibs, side-shifters, etc.—making it possible to handle not only palletised goods but awkward and irregularly shaped loads, too.

Pallet and platform *Yale* hand trucks range in capacity between 1,000 lb. and 20,000 lb. One model, in particular, which finds wide application in the soft drinks industry is the *Blue Streak*—a platform truck of 2,500 lb. capacity. Another is the recently introduced *Yale* hydraulic truck. This can be either pallet or platform, in 4,000 lb. or 6,000 lb. capacities.

PALLETLESS HANDLING

A new technique of palletless handling has been introduced by Conveyancer Trucks, Ltd., in the form of attachments to their fork trucks. They are the *Skid-stac* attachment and the *Conveyancer* load clamp. The *Skid-stac* attachment replaces the normal fork carriage and consists of a load-carrying plate and push-pull rack fitted with a gripper blade, the rack and blade being operated from the hydraulic system. The normal flat top pallet is replaced by a simple, cheap and flexible board with special properties. The cost of these boards is said to be much less than that for orthodox flat-top pallets; they are only about $\frac{1}{16}$ in. thick compared with about 6 in. for a wooden pallet, so that stack content can be increased without raising the stack height. Because the boards weigh only a few pounds more pay load per unit load can be transported and the empty boards occupy less space than empty pallets.



W. S. Barron screw elevator.

Handling milk with a 2,500 lb. capacity Yale "Blue Streak" hand truck.

The conveyancer load clamp has been designed for handling cartons, boxes, cases or crates without crushing or dropping, in unit loads ranging in size to a maximum of 65 in. wide × 42 in. long—without the use of pallets. A simple time study based on the handling of crated bottles, and taking into consideration the distance of 60 ft. from storage to road transport showed total trailer weight of 12½ tons loaded in well under 15 min.

Other attachments developed by Conveyancer for their trucks include the stabilising clamp, designed primarily for handling large unit loads of crated fruit. It is claimed to enable operators to handle large pallet loads over rough surfaces without fear of the load slipping.

Conveyancer have an extensive range of electric, petrol and Diesel fork trucks, and are well-known for their introduction of trucks fitted with fully automatic torque converter drive which simplifies controls and elimin-

ates clutch and gear change. Their trucks are widely used in the food industry because of their extreme manœuvrability in narrow aisles and their ability to stack to the full available height.

Another new method of palletless fork truck handling is called the *Accopak* system. It employs a number of paper slings in conjunction with a fork truck ancillary attachment. This equipment was recently demonstrated by I.T.D. (Stacatruc), Ltd., in collaboration with R. H. Corbett and Co., Ltd., and a *Stacatruc* battery-electric fork lift truck fitted with the new ancillary attachment was used.

The slings are used in place of normal pallets, and are made from a sheet of kraft paper suspended between two paper tubes measuring approximately 3 in. in diameter. Each sling supports a load which would normally be carried on a pallet, and it is lifted, transported and stacked by means of circular tines which are inserted in the tubes. These tines, measuring 2 in. in diameter and 52 in. in length, are manufactured from high grade manganese-molybdenum alloy steel with a high tensile strength of 55 to 65 tons p.s.i. and are fitted to the *Hydrum* load clamp instead of the normal clamping arms with which they are, however, easily interchangeable.

Entry of the tines into the tubes of the slings is facilitated by the fact that one tine is 2 in. longer than the other thus allowing it to be located in one tube first, the second being adjusted laterally by means of the independent arm control on the clamp. Horizontal movement can be applied independently to either arm to give a total combined range of movement from a minimum of 17 in. to a maximum of 60 in. between the tines.

Economy is the great advantage of this system. The cost of paper slings is negligible in comparison with the cost of pallets. In addition, an increase in storage capacity of approximately 25% is made possible by the fact that the 6 in. taken up by each pallet can now be occupied by an extra layer of sacks.

Conveyancer fork truck handling fruit boxes.

The solution to a typical handling problem in the food industry, this system for feeding cartons to margarine packing stations was installed by Paterson Hughes Engineering Co. Ltd. This company specialises in all forms of mechanical handling and in addition manufactures specialised equipment for the handling of potato crisps and similar foodstuffs. In conjunction with Lansing Bagnall, Ltd., they are sole licensees for the manufacture and sale of Greer Palletisers in this country.

WORM GEAR

An adaptable worm gear unit which can be used as an overdriving or underdriving unit and which is also suitable for heavy duty has recently been put on the market by John Holroyd and Co., Ltd., under the name *Verso*. The unit is built on a strong cast iron case. Solid feet at top and bottom give added rigidity and make possible a variety of mounting positions. The unit may be mounted from above or below, and may also be arranged with the input shaft above or below the output shaft. To invert the gear box merely requires the drain plug and combined breather and oil filler to be interchanged. The gear box is also under certain conditions capable of being mounted in other positions, such as sideways for wall mounting, or at an angle to the horizontal.

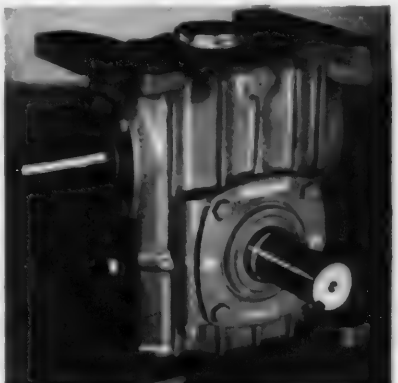
The centre distance is 2¼ in. and the unit is suitable for running at input speeds up to 3,000 r.p.m. Standard reduction ratios cover a range between 5/1 and 70/1. With ratios of 5/1 to 10/1 inclusive the gear box may be used for speed increasing.

Holroyds also make all types of worm gear reduction units covering a range from 1¼ in. centre distance up to 24 in. centres.

SCREW ELEVATOR

The complete range of *Hammond* vertical worm elevators, known as Screw Lifts, is now made under licence in this country by W. S. Barron and Son, Ltd. Six types and four sizes are available to suit a wide variety of materials, including granular products such as flour. Capacities range from 75 cu. ft. per hr. on 4 in. diameter units to 2,500 cu. ft. per hour on 12 in. diameter machines. The machines are extremely compact, and jig-drilled flanges render them easy to instal. Many parts are interchangeable, and sections can be removed or added as circumstances require.

Types A and E are gravity fed by means of feed hoppers and types B, C,



"Verso" worm reduction gear.

D, and F are fed by horizontal screw conveyors. Specially designed feeder junctions and expansion chambers enable them to handle difficult materials without risk of damage. Discharge heads can be fitted to discharge at any desired angle.

Enclosed drive units are fitted. Types A, B, and F being driven from the top and C, D, and E from the bottom. Type F is also provided with an independently driven feed screw for controlling or stopping the delivery flow of material when required. Type D has a top driving unit, additional to the bottom drive, for driving a horizontal conveyor where direct discharge is not practicable.

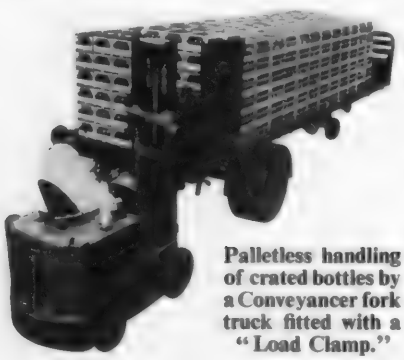
The elevators are self-cleaning, but sizes 6 in. and larger are provided with split casings for easy removal if further cleaning is required. In addition, quick opening tubes for easy cleaning can be fitted.

UNIT BAND CONVEYORS

A complete range of unit band conveyors and elevators is made by A. L. Marshall (Carlton), Ltd., under the name *Masterveyor*. The standardised unit construction of this equipment enables plant to be extended whenever required, to be inclined by the inclusion of support legs or suspension rods to form an elevator or to be re-sited.

Where heavy duty conveyors and elevators may be necessary chain conveyor equipment is supplied. These are available with wood or steel slats and the specification incorporates precision steel chains.

The A.L.M. *Pacemaker* portable band conveyor elevator is also supplied by this company. It can be used horizontally, at various heights, or as an inclined conveyor delivering up to a height of 7 ft. 3 in. It is fitted with a rubber-covered band with a gripping surface and at its maximum height it is operating at an angle of 30°. The machine is very manœuvrable and can be held rigidly in position by a quick action lever controlled stabiliser. Height adjustment is by means of a hydraulic jack operated by a hand pump.



Palletless handling of crated bottles by a Conveyancer fork truck fitted with a "Load Clamp."

Marshall's unit band conveyor.

FLEXIBLE IDLERS

A flexible belt conveyor idler which shapes itself to the load being carried has been introduced by Joy-Sullivan, Ltd. The *Limberoller* uses only two bearings. Basically it consists of a *Neoprene* covered steel wire cable, with swaged steel shank ends, and two sealed-for-life double row precision ball bearings. A series of resilient abrasion and flame resistant *Neoprene* discs are moulded to the cable. The bearings are packed with a long shelf life grease for operations in a temperature range from −35°F. to +275°F. They fit into slotted mounting "ears" on each side of the idler supporting bracket. The discs are not affected by oil or grease.

The latest idler stands use a cotter pin as a more simple and effective bearing keeper in place of the spring clips formerly used. Four sizes of *Limberoller* are now available accommodating belt widths from 18 in. to 36 in.

Weighing only one third as much as a conventional three-roll steel idler, the *Limberoller* can be spaced further apart on a length of conveyor, while another advantage is that no cover decking is normally required.

SLAT BAND CHAIN

The *Coventry* slat band chain, manufactured by Renold Chains, Ltd., forms a uniformly flat, smoothly moving platform suitable for carrying bottles, tins and similar packages.

Each "link" comprises only two components—slat and pin. The latter is a force-fit in the outer barrels of the slat, and a running-fit in the centre barrel of the adjacent slat. Each wheel tooth engages the slat barrel at its hinging point and thus the driving force is transmitted directly from tooth to slat, the pin merely serving as a hinge-pin.

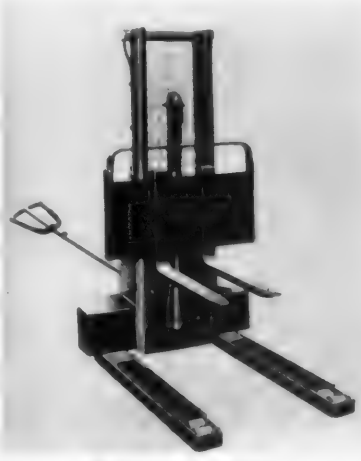
The wide contact face of tooth to slat serves to reduce wear to a minimum. The chains are available in two ranges —one of stainless material, the other of case-hardened mild steel for dry conditions as on packaging machinery. Each range covers slat widths from 3 to 7½ in.

For use with the chains there is a stock range of wheels having from 19 to 31 teeth, machine-cut to gear accurately with the chain. Wheels with special numbers of teeth are available to order, but the recommended minimum is 19 teeth.

Using Youngman's pallet conversion set.

PALLET CONVERTORS

Pallet convertor sets which enable existing flat wood pallets to be changed into post pallets quickly and easily without screws or clamps and without special provision being made in the existing pallets are made by W. C. Youngman, Ltd. This makes possible the stacking of awkward loads, such as sacked goods, or those liable to crush when tiered on ordinary flat pallets. The ease with which these convertor sets can be assembled permits standard pallets to be used either flat or as post pallets as and when desired. The bars or even mesh sides can be fitted, according to particular requirements. The two members are simply coupled together and the convertor set is then lifted on to the pallet, the corner plates locating on the outer edges of the pallet, allowing full use of the existing deck area. When not in use, their two-piece construction enables pallet convertors to be easily nested or stacked in the minimum of space.



Eccles hand stacker.

GLASS FIBRE TRUCK

Over the past few months James Hustler and Son, Ltd., have developed a range of resin-bonded laminated glass fibre trucks and containers.

This material is said to offer a number of outstanding advantages. Whilst being light and strong, the internal surface of a truck body or container is completely smooth and offers a very high degree of resistance to acids and alkalis. In the case of a truck the wheelbase is strongly bonded into the body moulding, and can be fitted with either wheels or castors, giving an article which, whilst an acceptable

"Coventry" slat band chain.

substitute for stainless steel in many processes is less than half the price. The truck is offered in two standard sizes, 3 ft. × 2 ft. × 2 ft. and 4 ft. × 2 ft. 6 in. × 2 ft. Special sizes are also available.

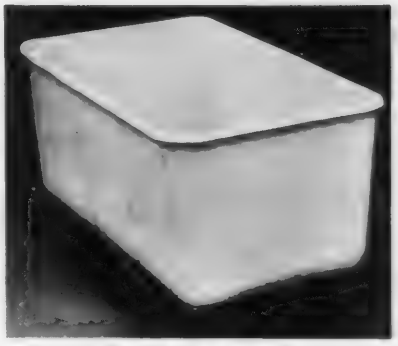
Many types of container, including small tanks and vats, can be manufactured from this material.

BOGIE TRUCKS

A new model has been added to their range of low-loading bogie trucks by Powell and Co.

Known as the *BGM*, it is intermediate in size between model *BGA* (capacity 700 lb.) and model *BGX* (capacity 4,500 lb.). Its dimensions are 21 in. × 21 in. × 3½ in., and its weight is 30 lb. It has a capacity of 2,500 lb.

This handy little device is fitted with



Glass fibre truck.

four roller bearing steel wheels, revolves freely on the centre wheels and is extremely mobile. Bolt holes are provided for mounting platforms or for securing bins, container bodies, etc.

STACKERS AND LIFTERS

Eccles (Birmingham), Ltd., who moved last August into a new factory, manufacture a range of standard stackers and lifting trucks, though a large proportion of their output is devoted to specialised equipment. They have considerable experience in manufacturing for the food industry and a large variety of special trucking and stillage equipment for use in the processing of foods has been designed.

Lifting trucks are available from a capacity of 10 cwt. up to 2 ton models and a variety of these have a lowered height of 3½ in., these being suitable for pallets with a leg height of 4 in. provided that they are not double-faced pallets and do not have centre bearers.

The *Eccles* hand stacker of 15 cwt. capacity with an approximate weight of 8 cwt. unladen, can be used on the upper floors of warehouses where floor loading is restricted. Special heavy duty easy-roll wheels make it possible for one man to move the maximum load of 15 cwt. easily and this is facilitated by the new positive castor steering which is said to give all the benefits of maximum four point stability while at the same time obviating the difficulties of manœuvrability usually associated with castoring trucks. Models are available lifting to a height of 4 ft. 6 in. or 6 ft. 6 in. and in special cases stackers may be made to heights between these figures. The overall height of the 4 ft. 6 in. stacker is 6 ft.; this makes it suitable for use in loading vehicles and also operating through low doorways.

The method of lifting may be by means of an hydraulic pump which gives a speed of lift approximately 1½ min. to a height of 4 ft. 6 in. Where the stacker is to be used extensively it is strongly recommended that the battery electric model be used. This operates from a 12-volt traction bat-

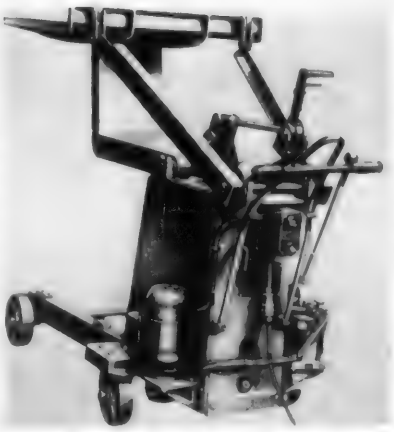
tery and suitable charging equipment is available. The whole of the electric hydraulic installation is contained in a closed box and is readily removable. The forks, which as standard have a length of 25½ in., are adjustable for width. The column has a mesh guard to protect the operator in the event of any part of the load slipping.

This range of stackers is available with a variety of positions and sizes of fingers but it is possible for the forks to drop flush into the fingers giving a lowered height of 3½ in., alternatively the fingers may be arranged to straddle the forks or *vice versa*.

LIFTING TRUCKS

Power Jacks, Ltd., supply a lifting truck which, they claim, can lift ½ ton to nearly 5 ft. in 1 min. by hand. A power-operated version of this Newton *Hydratruck* is claimed to lift this load in 25 sec. The truck is designed for the smaller handling jobs always going on in any factory—loading and unloading lorries, lifting and lowering components, units, goods, cases, etc. Several of them are in use at food factories, dairies, breweries, etc.

The truck is simple to operate. To lift goods, the release valve is closed and the pump handle worked, while to lower, the valve is turned to the appropriate position. The platform may be stopped in any position by closing the release valve. The speed at which the platform descends is controllable. The truck itself is small enough to be efficiently handled in confined spaces and gangways and can be pushed by hand or towed behind a tractor. The platform is adjustable and can be tilted backwards or forwards.



Power operated lifting truck.

RIDER CONTROL

A new fork lift truck has been added by Matling, Ltd., to their range. Known as model RFLT2 it is rider controlled and has a maximum lifting capacity of 3,000 lb. at a load centre of 20 in. It has been designed to provide maximum manœuvrability in restricted spaces.

The truck is powered by a 24-volt battery which operates a heavy duty constant speed reversing motor. Transmission to the single rear wheel is through a multi-plate clutch and a gear box providing three speeds. The advantage of this arrangement is that it dispenses with the use of complicated electrical control gear equipment.

Lifting and tilting are effected hydraulically by means of a separate 24-volt series wound motor direct coupled to a gear type pump which supplies pressure to the lifting and tilting jacks operating the telescopic mast assembly. The hydraulic tank is placed under the driver's seat and incorporates a pressure relief valve which prevents the operator from lifting a load of excessive weight.

The truck controls are of the motor-car type, light in action and consist of a conventional steering column, a "dead man" pedal on the right of this and a foot brake pedal on the left. A parking hand brake is provided close to the operator's left knee. The three gears are selected by means of a lever on the steering column. Reverse of any gear can be obtained by pressing a foot switch next to the "dead man" pedal. A green light on the facia panel shows when forward speeds are engaged and a red light indicates reverse motion.

Various safety devices have been incorporated to ensure foolproof action. A key switch must be turned and the "dead man" pedal actuated before the equipment can be operated. The electrical circuit is broken when the brake pedal is depressed and when the charging plug is left open. Mechanical interlocks are provided on the tilting and lifting control levers. Positive stops inside the jacks ensure that neither load carriage nor mast can overtravel.

Heights of lift ranging from 54 in. to 144 in. can be provided. Mast tilt is 2° forward and 10° backward. The cast steel lifting forks which are laterally adjustable from 13 in. to 27 in. are supplied in lengths to suit customers' pallets. Every truck produced is tested with a 25% overload. Squeeze clamps, rotating heads, jibs, booms, pole forks and other attachments are available.

An interesting feature of this truck is that wherever possible standard components have been incorporated which are interchangeable in all trucks in the Matling range.

A new rider electric truck, model FOER 3, made by Lansing Bagnall has a turning radius of 49½ in., and offers outstanding manœuvrability. It will stack 40 in. × 40 in. pallets at 90° in a gangway no more than 103 in. wide.

Capacity of the standard FOER 3 is 2,300 lb. at 20 in. centre, though a

A. and C. Fenner's mobile elevating conveyor, fitted with pick-ups to link with conveyor units on different floor levels.

Lansing Bagnall, FOE3 showing easy access to traction circuit and switchgear.

Matling battery powered fork truck, capacity 3,000 lb. at 20-in. showing accessibility of battery compartment, motor and power unit.

3,000 lb. model will be available to order. Length with standard 36 in. forks is 95¼ in. The truck has a service weight of 5,300 lb.

The three wheels are 12 in. in diameter and of substantial width, solid rubber shod. The single rear wheel is steered by a car-type wheel.

Rear wheel drive, as in other trucks of the Lansing Bagnall range, is from the variable speed shunt wound motor. Speed is infinitely variable up to 5 m.p.h. A micro-switch prevents the truck from running without the operator in his seat, and another cut-out disconnects the power circuit when the hydraulic footbrake is applied. This hydraulic brake acts on the two load (front) wheels; a hand parking brake acts on the same brake shoes.

Exclusive Lansing Bagnall regenerative braking is incorporated in the circuit, and limits the speed of the truck on descents as well as returning power to the batteries at normal speeds. Rheostatic braking is also standard, coming into action at lower speeds to control the truck almost to a standstill. It is claimed that with these two systems in operation, the hydraulic brake is rarely needed except in emergency.

The twin masts lift to a maximum of 10 ft. with 58 in. free lift, 10° backward tilt and 2° forward. Lift and tilt motions are under hydraulic control, actuated by a gear pump supplied from the main battery. Pressure relief valves prevent overloading, while flow valves control speeds of lowering and tilting.

Anyone receiving a mains supply of 200-250 a.c. can recharge the batteries without special equipment, as the truck is fitted with a selenium rectifier charger which has only to be connected to the mains supply. An interlock prevents the truck from being driven while the mains supply is connected, and the current is automatically switched off when the batteries are fully charged. In this way the truck can be left overnight while charging is being carried out.

Two levers beside the driver's seat control lift and lower and tilt. Extra hydraulic attachments such as squeeze clamp, side shift or rotating head can be fitted and are operated by a 3rd control. A neat instrument panel on the head of the steering column contains the circuit switch, horn, button, and forward and reverse selector. On the driver's left is the hand parking brake lever, and at his right foot are the separate hydraulic brake and speed control pedals.

This "Flowtina" conveyor has been swung through a 90° arc.

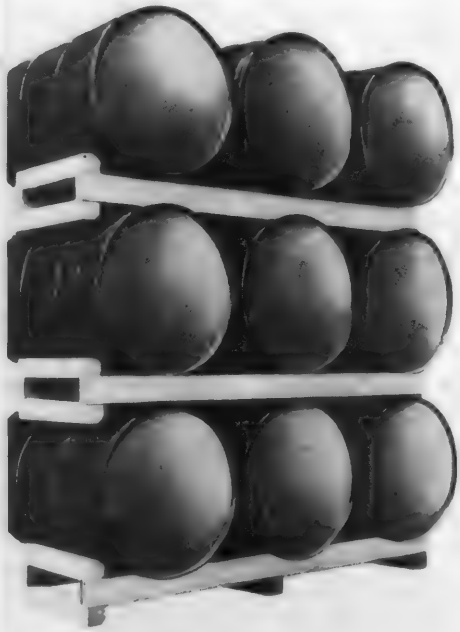
FLEXIBLE CONVEYOR INSTALLATIONS

Fisher and Ludlow, Ltd., offer a full range of conveyors including the *Flowline* belt and *Flowlink* overhead chain conveyors both of which are based

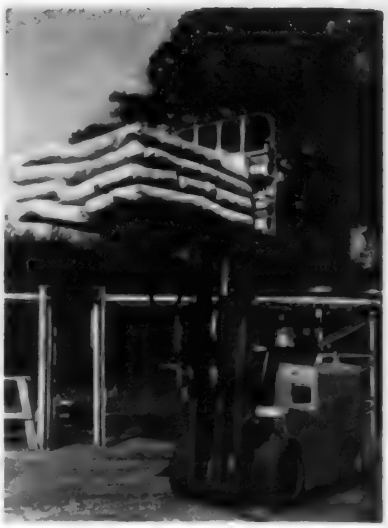
upon the unit construction principle incorporating strong pressed steel sections, light in weight, affording maximum flexibility and adaptability. Of similar construction is the *Flowmaster* overhead conveyor system which is able to carry out a multiplicity of duties such as collecting, storing, transporting and presenting components or products, to work stations—all operations being electronically controlled. The *Flowporter* is fundamentally the *Flowroll* gravity roller conveyor (now fitted with patent dome and rollers) adapted for powered belt conveyancing which will accommodate a maximum rise or fall of 30° from the horizontal.

A number of new developments in conveyors include the *Flowscope* mobile telescopic gravity conveyor in which the sliding members may be retracted or extended to provide a connection between loading and discharging points in warehouses, receiving or despatch bays and vehicles, etc. Of somewhat similar function is the *Flowtina* flexible roller conveyor unit also mobile, mounted on castor legs and working on the lazy tongs principle which, when inserted into a normal conveyor line, allows a through way when in the fully closed position. Alternatively, the *Flowtina* may form the bridge between a works station and nearby conveyor circuits—or even set in an arc to link up points at 90°. Another new design is the *Flowscate* gravity roller conveyor suited especially for packaged goods which travel freely on the skate wheel rollers.

Below: **Youngman's drum pallets.**



Above: **Close up of the "Accopak" equipment being used in a confined space with the tines entering paper tubes. Note the pallet system shown on the right of the stack.** *Right:* **A battery electric Stacatruc supports a full "Accopak" load.**



An entirely different version is the *Fisholow* towline trolley system where the trolley is towed along a predetermined route by a *Flowlink* overhead conveyor to deliver or collect goods at selected stations for storage or packing, etc.

DRUM PALLETS

W. C. Youngman make a range of drum handling aids, including drum pallets. Each of these will accommodate a unit load of three standard 40 gal. drums for stacking in tiers of three or more. A hinged stop end and a small ramp unit enables the drums to be rolled on to the pallet. Two types of pallet are supplied, intermediate and base type, the latter having an extra bearer to support the load. All intersections are bolted and corners are cleated to prevent racking. Other drum handling aids include drum trucks, drum skids and the *Donald* drum lifter and stand.

FORKLIFT RANGE

Among new trucks introduced by Ransomes Sims and Jefferies, Ltd., is the new *Forklift* 3000, capable of handling loads up to 3,000 lb. to a height of 14 ft. at 20 in. load centre (export rating up to 1,500 kg. to a height of 427 cm. at 60 cm. load centre). This truck follows very closely the design of the *Forklift* 2000 which appeared on the market 18 months ago. A very large battery (480 amp.-hr. capacity) is fitted ensuring that a full day's work can be carried out before recharging becomes necessary. The control cabinet which forms the base of the driver's seat, is hinged to simplify inspection of all vital components. Other improvements are the fitting of Ransomes-manufactured brakes and shaping of the ballast weight to increase manœuvrability.

To replace the FL 40 truck, Ransomes have designed a new truck to be known as the FL 4500. Its capacity is 4,500 lb. at 20 in. or 4,000 lb. at 24 in. (The export rating is 2,300 kg. at 50 cm.) The FL 4500 is fitted with a much larger battery than the FL 40, having a 640 amp.-hr. capacity, and like the FL 3000 is fitted with brakes of Ransomes' own manufacture.

Among their other machines are the FL 10 fitted with a sideshift attachment giving a lateral movement of 4½ in. either side of the truck centre line, and the FL 2000 fitted with a *Hydrum* load clamp (see FOOD MANUFACTURE, March, p. 127). The FL 10 has a normal load capacity of 1200 lb. at 15 in. centre (export rating 550 kg. at 38 cm. load centre) and being very small it is ideal for close quarter operation, the side shift attachment simplifies operation where it is not convenient to manœuvre the truck for accurate positioning of the load. The *Forklift* 2000 has a load capacity of 2,000 lb. at 20 in. (export rating 1,000 kg. at 60 cm.); it is streamlined for tight corner work and has a low collapsed height for maximum fork lift. The *Hydrum* load clamp with which this truck is equipped enables bales, bins and bundled goods to be handled without pallets. It is claimed to represent a great advance in lift truck equipment, embodying simultaneous and individual control of the load arms, and automatic maintenance of gripping pressure all the time a load is being carried.

Among their range of electric tractors and platform trucks are the T 4 and the NU 6 models. The T 4 is capable of hauling trailers of up to 22,000 lb. gross load on level concrete floors. It is contactor controlled and has a clutchless drive; pneumatic tyres will deal with uneven surfaces. The NU 6 is an electric truck with a low fixed platform 6 ft. 9 in. × 3 ft. 6 in. and a capacity of two tons. The standard speed when unladen is 5-6 m.p.h., and when laden 4-5 m.p.h.

GRAVITY CONVEYORS

Advantages claimed by Manufacturers Equipment Co., Ltd., for their *Rapistan* gravity wheel conveyors include a minimum of gradient and excellent tracking so that sliding off—especially at corners—is prevented. Remote-controlled spur curves are also supplied. These make it possible to direct goods to the spot at which they are required, while jamming and piling-up is prevented by *Autoblocs*.

The company also make a conventional roller conveyor with swaged ends to prevent damage to packages, mobile reversible conveyor units, the *Floorveyor* floor-to-floor conveyors (also reversible) and the *Table-Veyor*, which is in effect a moving table-top of indefinite length with a number of uses. Any combination of these units can be changed, moved or re-assembled to suit different circumstances.

PLATFORM TRUCKS

A self-propelled low platform truck called the *Celtruck* is made by Angel Truck Co., Ltd., for electric and manual operation. The trucks have two detachable sides 10 in. high to enable loose goods to be carried safely. The traction unit is a form of self-propulsion known as the *Tractamatic* drive which consists chiefly of an independent wheel drive which permits overriding in both directions. It free wheels when switched off, thus sparing the batteries. The truck has three speeds forward and three in reverse controlled by a handle on the pushbar. The two driving wheels can be fitted with brake drums operated simultaneously by a car handle type grip, and left on for parking, at extra cost. Load capacities vary from 6-8 cwt. to 10-12 cwt. Propulsion is by a 24-volt starter battery and the running cost in electricity is said to be 1½ kw. per day. Adaptations of superstructure can easily be made and the company are considering the fitting of a large box body constructed from glass fibre with internal corners rounded off which would be suitable for conveying liquids or semi-liquids.

MIDDLEWEIGHT HANDLING UNITS

More than 40 lifting, moving and stacking units are made by R. H. Corbett and Co., Ltd., in their *Hyphen* range. The machines are particularly intended for the smaller manufacturer or for the many small handling problems in a big plant, and prices start from £79. They are said to be specially suitable for work in limited spaces and on jobs which do not call for consistent long-distance movement.

The handling of standard sized drums and barrels is a speciality of this company. They supply lorry loading and stacking machines, *Hydrum* "on the roll" racking and a large number of attachments for fork lift trucks. The *Hydrum* "on the roll" racking comprises a standard rack designed to store barrels four high and six deep with the bays erected side by side without the intervening aisles usually required for the removal of barrels.

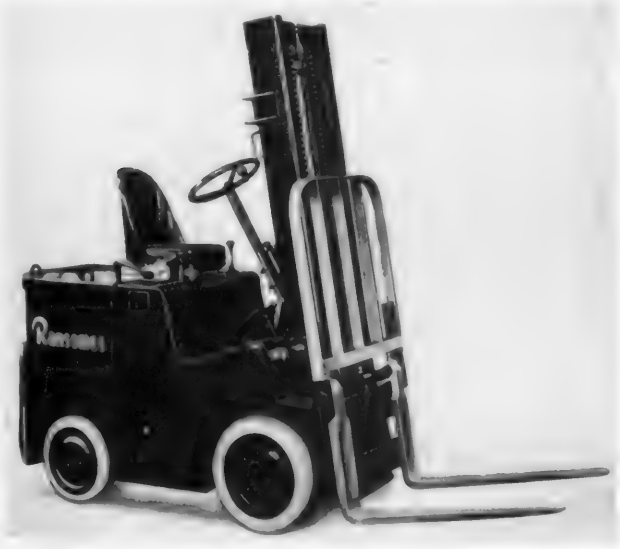
The first barrel is rolled on to the empty runner and rolls down into an "arrester gate." Further barrels are then rolled in behind the first barrel, the second barrel resting against the cross bar of the "arrester gate" so that the removal of the barrel in the gate is not impeded. When a barrel is removed the mechanism is tripped by the forks of the truck or stacker and another barrel rolls into the gate. The remaining barrels gravity feed down the rack. The system is to save space and time in removing barrels.

Among their attachments for fork lift trucks Corbett included clamps for handling up to four drums at a time. Another clamp for handling cartons in a load approximately 3,000 lb. without pallets is also available. They also make the *Hydrum* forward discharge bin attachment which is made to fit any fork lift truck and operated by the lift of that truck and is intended for the rapid collection and disposal of scrap and the bulk handling of loose materials and solids. A bin dumper is in day and night use at one of the largest food factories in London, where it handles vegetable waste in loads of approximately 1 cubic yard at a time into outgoing transport for disposal.

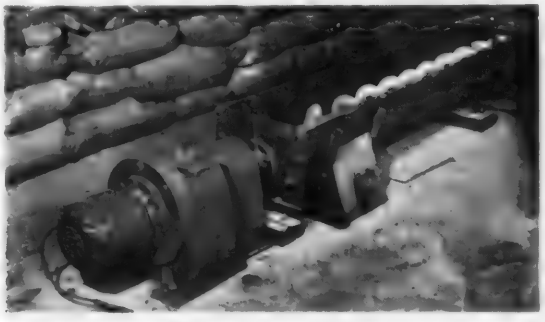
"Rapistan" gravity conveyor.

FLOOR-TO-FLOOR ELEVATOR

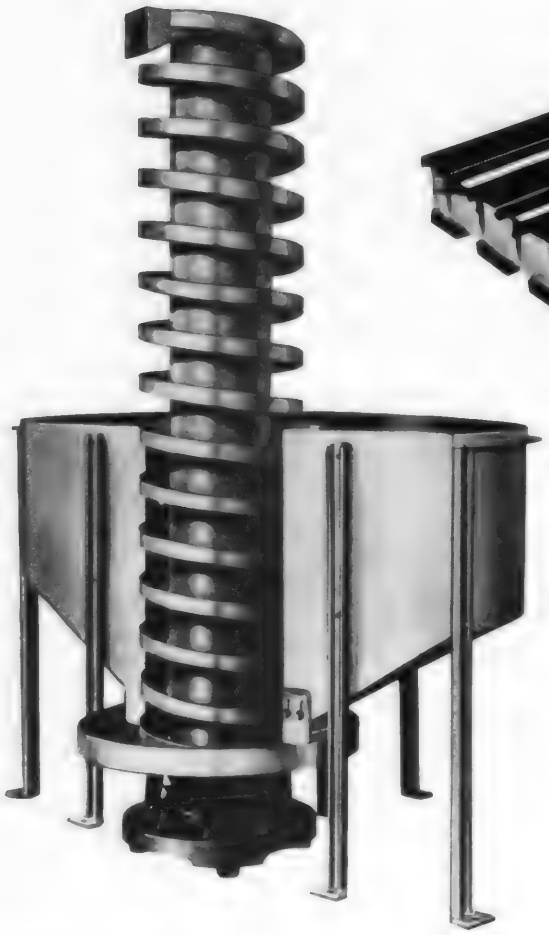
An inexpensive goods elevator for bulk handling between two floor levels, has been produced by Barron and



Ransome Sim's new Forklift 3000 truck.



Worm conveyor made by Electropower Gears, Ltd., for handling sugar at Manbre and Garton, Ltd.



Left: **Vibratory spiral elevator operating in conjunction with a bulk feed hopper (capacity 30 cu. ft.). The makers, Valley Products (Lye), Ltd. claim that the unit is satisfactory on almost all free flowing or granular materials but say that it is unsuitable for operation on fine powders such as flour.**

Flat steel pallets.

Shepherd, Ltd. A moving platform or cage is cantilevered out from a main frame in such a manner that it requires no attachment to the surrounding structure since the unit is entirely self-contained.

The goods elevator has been installed in the stores area of the B.E.A. at London Airport, where it is used to transfer stores trolleys between the two levels of double-stage storage racking. Operation is by push-button control and power is provided by an electric motor fitted with an electro-magnetic brake driving through chain and pinions with limit switches and electrical and mechanical interlocking gates at both levels.

"ROUGHRIDER"

Uneven ground surfaces are no obstacle to Salisbury Precision Engineering's new Sherpa *Roughrider*.

They claim it can move a load up to 7 cwt. over cobbled surfaces. Manual effort in lifting is minimised by the dual-speed pump which allows a fast rate of lift up to 2½ cwt. and, by the adjustment of a single control lever, in the higher range of weights effort is correspondingly reduced. The speed of lowering can be controlled minutely by the operation of a simple lever.

FLAT STEEL PALLETS

By the ingenious incorporation of "V" section principles, a flat steel pallet claimed to have high strength to weight ratio characteristic—and yet which is available at low cost—has been evolved by Fisher and Ludlow, Ltd.

This pallet comprises "V" section cross bearers, ribbed for additional strength, fusion welded at all points of contact to "V" shaped longitudinal flanges which form the seating base of the pressed steel slats, resulting in a pallet of exceptionally robust, rigid and durable construction. Tests have established that a nominal capacity of 2 tons per pallet (48 in. × 48 in.) could be safely achieved with a maximum stack loading of 10 tons. Pallets can be supplied in any size and to cater for any loading capacity. The *Flowstack* "V" line pallet is a two-way entry type, of reversible or non-reversible pattern for handling by fork lift or hand pallet truck (with suitably modified base slats) and provision can also be made for crane slings.

Palletisation outlay is cut as the need for frequent replacement is reduced.

AUTOMATIC LOADING AND COUNTING

A new pre-determined type of automatic loader, which lifts and counts automatically and which can be halted automatically at any pre-determined height and after any pre-determined number of lifts has been developed by Lodematic, Ltd.

The 24-in. wide loader pushes like a small barrow. The platform lifts on receipt of the load and descends when unloaded. A counter attachment can be pre-set to stop at any given number and the *Lodematic* counts as it lifts. It is intended for single-handed sack stacking from shoulder height and for lorry loading or rapid repetitive stacking of boxes, cartons and chests. A smaller model which pushes like a sack truck under load is also available. These *Lodematic* machines are weight sensitive and excessive weights cannot be lifted.

Lodematic have also introduced a new straddle stacker with which up to 12 ft. lift on forks or goods platform is available. The stacker is 30 in. wide and can be equipped with a 24-in. square goods platform or forks of varying length.

CONVEYOR DRUMS

A motorised conveyor drum called the *Joki* is made by A. and F. Mountain in which the motor and gearbox are contained inside the drum itself. It operates almost noiselessly and the absence of external fittings, gears, etc., makes for greater cleanliness.

Motors are normally supplied for 200/240 volts single phase or 400/440 volts three phase supply, but can also be supplied for other voltages and for D.C. They range from 1/10 h.p. to 50 h.p. with peripheral speeds from 33 ft./min. upwards.

FACTORY LAYOUT AND MATERIALS HANDLING

By J. M. Beskine, B.Sc.(Eng.)

Good layout is the first essential in improving materials handling. Here the author considers some basic ideas of good layout before describing modern trends in handling equipment for raw materials and finished products.

IF THE layout of a food factory is bad materials handling improvements cannot entirely offset its disadvantages. However, in some cases it is possible by means of a strategically installed conveyor or by using mobile handling equipment such as fork trucks, to partly overcome serious space restrictions and other disadvantages, provided that the best use has been made of existing premises. If this has not been seen to, it is quite possible to invest a considerable sum of money in mechanical handling equipment which is partly employed in duplicated handling.

Layout problems

Many examples of materials handling improvements due to improved factory layout could be given. One is of the modernisation of a very large meat packing factory. Originally this was sited in a number of scattered and badly arranged buildings. The factory had "grown up" this way. A major reorganisation was instituted. Among other improvements was the changeover from no less than seven separate buildings to three interconnected buildings for curing bacon. Six handling operations were eliminated in this way.

Another example is the changeover from the use of a large multi-floored building for the processing of meat, to the use of a single floor. Among the advantages gained by better layout were reduced man-hours per ton of meat processed, faster throughput, greater working space and improved hygiene.

Many more examples could be given if space permitted. However, it is possible to give general recommendations concerning the reorganisation of factories. Firstly, the processing equipment should be carefully examined to decide whether it will permit of full advantage being obtained from the new lay-out and the new handling equipment.

When deciding upon whether to keep existing processing equipment, special attention should be paid to expensive processes or those which have not been mechanised, or which are not fully effective. One should not simply compare equipment in one's own factory with that seen in factories visited or described in catalogues. There may be simple answers to apparently complex problems, but one may have to go out and look for them. For example, there is a new kind of selective freezer which freezes moist objects on to clean refrigerated surfaces and removes them by scrapers. This device is suitable for use in conjunction with a conveyorised production line. It speeds the skinning and boning of poultry, and the peeling and sorting of fruit, vegetables and meat.

The next step is to study carefully the flow chart for the complet cycle of operations. Although the details will vary widely according to the type of food being produced, the purpose is the same: it is to ensure that the best possible sequence of productive operations is designed. This is a matter for the food technologist as well as the food engineer. It is of course also necessary to ensure that the various machines and benches, etc., are capable of being balanced from an output point of view, also to incorporate a degree of flexibility to suit the products in question. The end result of this stage is an ideal process chart. From this it is possible to develop an ideal layout. This will take into consideration the output rates of the various operations and processes which will be designed to ensure that bottle-necks do not arise. However, no decision will so far have been made regarding physical layout.

The next stage is to compare the ideal layout of the machines, etc., as obtained from study of the process chart, with the existing lay-out. It may be possible to instal equipment exactly where called for. Generally this can be done only if the premises are new or very large. Usually it is necessary to modify the ideal layout to suit the actual premises without introducing heavy penalties in the form of double and treble handling.

A good deal of publicity has been given to the use of scale models and of various types of charts. These are often used when attempting to rearrange factory layout to eliminate unnecessary handling. Scale models are very useful tools if an engineer wants to "sell" a reorganisation scheme to his directors. They certainly assist in visualising what a technician is talking about. But they do not solve the problem. Somebody must think out the changes which are necessary. It is equally easy (or difficult) to rearrange premises by comparing the ideal layout and a plan of the premises. Charts are also useful. What must be done is to bend, fold, double-up, distort, or otherwise modify the ideal lay-out corresponding to the equip-

ment in use or to be used, so as to fit it into existing or modified premises.

Where new factories or completely reconstructed premises are to be built the problem is somewhat simpler. It is possible now to match an ideal building to an ideal layout. One example of unorthodox factory design may be quoted to illustrate the fact that there are probably as many "correct" answers as there are skilled factory layout engineers. This concerns a new meat packing factory under construction in Australia. It will not employ the usual single-storey straight-through layout favoured by many authorities. Instead it will consist of a number of prefabricated buildings arranged to form six wheel spokes radiating from a central area, and linked by five straight sides in the form of an open hexagon. One spoke will radiate out through the open side of this hexagon to a further building at right-angles. Thus greater flexibility will be obtained.

Handling raw materials

Great economies are being made by using modern mechanical handling equipment for such purposes as the off-loading of road and rail vehicles, the bulk handling of fruit and vegetables into and out of stores, the storing and handling of packaging materials, etc. Equipment favoured for such purposes are fork trucks, tractor-mounted loaders, and portable conveyors. In some cases it is possible to employ the pallet principle right the way back to the harvesting field as in the case of fruit and vegetable canning. The fruit or vegetable pickers may load the crop directly into standard wire-bound boxes, designed to fit on to a standard pallet. These are taken by lorry to the factory and off-loaded by fork truck. Many handling operations are thereby saved, not only prior to arrival, but during and after off-loading. By making use of low cost expendable pallets it may be possible to avoid returning pallets to the harvesting field, though there should be no great difficulty in maintaining a return flow.

In practice the use of standard boxes and pallets is probably justified only in the case of crushable fruits such as berries. For vegetables generally, bulk handling in tipping lorries is more economical. These may be dumped to form stockpiles which are reclaimed by mobile loaders and similar equipment. A typical example is shown on p. 213, which illustrates the handling of carrots in a canning factory. Similar methods may be used when handling other products, for instance fish at a fish-meal factory.

Another method, used in animal feeding stuff production and capable of general application, is to use a fork truck attachment mounted on a tractor-loader, in conjunction with pallet-type boxes which are handled by means of shoulders. These boxes may be tipped and are suitable for handling ground materials such as meal and flour. Below is shown a bulk container vehicle with a number of 1-ton tipping containers, discharging meal into a pair of pallet-type boxes. The other photo shows a pallet box being tipped by the fork attachment on the tractor loader.

Bulk deliveries of powdered and other free-flowing materials are becoming very popular. This is because of the economies rendered possible during transportation. However, to take advantage of bulk transportation it is necessary to have suitable bulk off-loading equipment. Usually, when this is installed manufacturers also instal complete bulk handling systems for handling into store and from there to the processing department. Various types of equipment may be used—mechanical and pneumatic conveyors, unit storage bins moved by fork truck

Right: **Unloading animal feeding stuffs into Kennet pallet-type open containers from tipping 1-ton bulk containers.** *Left:* **Closed pallet-type container being tipped into a feeding unit by fork truck attachment on a tractor loader.**

Handling carrots in bulk at the "Charmond" food factory, by means of a Muir-Hill LH-1 loader. The carrots are picked up from an internal stockpile and charged in to a hopper-fed conveyer some 50 ft. away, whence they go to the washing machine on the process line. Some 60 to 80 tons per day are handled without damage.

or tractor, etc. One system which is growing in popularity employs fluidised handling. This is a form of pneumatic handling, employing fans and pipes. Materials which may be handled in this way include flour, bran, cocoa powder, powdered eggs, milk solids, soluble coffee, powdered cream, salt, starch, refined sugar, etc. One system operates with a solid-to-air ratio of up to 200 to 1 and conveys materials at 5 ft. per sec.

Two types of bulk delivery are in use. One employs large road tanker vehicles, rail tankers, or demountable tankers. This is used where a single product only is being delivered. Refined sugar, grain, etc., may be handled in this way. For certain materials, *e.g.* brewer's grains, etc., tipping wagons may be used. The second type of bulk delivery makes use of demountable unit containers or lorries carrying a number of tipping containers. In either case it is possible to deliver a number of different materials on one lorry. The use of box-type pallets for delivery of raw materials is generally similar, and this, too, is likely to show great economies.

Where raw materials are delivered in unit containers, it is not always necessary to have large storage silos in the factory. The materials may go directly to the hoppers of the processing machinery. However, although this is to be recommended for certain types of materials and for certain tonnages, it is not to be generally recommended. There is much to be said in favour of bulk storage.

Unfortunately here, again, general recommendations are impossible. This is because conditions vary greatly, according to the material handled and factory layout generally. In principle it is cheaper to employ bulk storage. In practice, for certain types of material it may be more satisfactory to use a compromise, bulk storage in small unit lots. Factors influencing selection include the economics of the case, considerations of hygiene, etc. Then, too, if no great amount of capital is locked up in using unit containers, this might be an important consideration—providing there is no great increase in cost due to handling in and out of store, stacking, etc. For this reason, as a matter of principle, one should employ pallets or pallet-type containers when storing materials in unit lots. With these one or more fork trucks, pallet trucks, etc., may be necessary.

One example may be quoted to illustrate the inter-relationship between handling costs and purely technical considerations. It has been recommended by various authorities that pickle manufacturers who store their own materials should employ bulk storage rather than storage in casks. However, the Fruit and Vegetable Productivity Team which visited the U.S.A. in 1952 found that bulk-stored vegetables in the U.S.A. were generally of a lower quality than vegetables in Europe. The point to note is that if handling and storage methods are changed because of economic considerations, full attention must be given to the changed technical requirements. If this is done, there is no reason whatsoever for any reduction in standards of quality. It may be necessary to take great care in design of bulk storage facilities and to incorporate various innovations. These, however, should pay for themselves over and over again, in view of the greater handling economies thereby rendered possible.

Where fork trucks and pallets are employed certain important advantages are easily obtained without extra cost. For example, it is easy to follow the British Food Manufacturing Industries Research Association's recommendations regarding the storage of raw materials to combat insect infestation. Some of these recommendations are given in Table 1. It will be seen that if raw materials are palletised it is easy to stack them where required, to move them from the store to the factory and back, to isolate returned goods from raw materials, to keep certain raw materials separate from one another, to use stocks in strict rotation, to label every parcel of goods separately and to find it easily, to isolate for special attention ingredients which have been kept for long periods, etc. Similarly it is easy to move raw materials to various points in the factory as required. Of course, in an actual installation, one might find it more economical to employ conveyors or to use a combination of conveyors and fork trucks, etc.,

or to use tractors and trailers, with pallet trucks or stackers in the store, etc. The general principles of materials handling apply to food factories equally with other factories and equipment selection must be carried out only after proper study of the specific problems to be solved.

In some factories the storage of packing materials may be quite a problem. There may be insufficient space. They may be liable to damage. Generally, if palletised storage is employed, the extra storage space in the previously unused headroom may provide sufficient space. Another way of solving the problem may be to change the packaging method. One example illustrates what might be achieved. An American packaging firm has produced a new-type container for frozen eggs. It is delivered flat and consists of plastic-lined material. The firm has published an advertisement showing a boy of about eight years of age, holding a stack of containers in one outstretched hand. These, it is stated, when packed, will contain no less than ½ ton of frozen eggs! The containers are formed into cylinders which are easily filled. They are slit open and are easily disposed of. They may be reclaimed, in fact. The manufacturers point out that because of the very small space occupied by these containers prior to filling, some 85% is saved in storage space.

TABLE I.

EXAMPLES OF B.F.M.I.R.A. RECOMMENDATIONS FOR THE STORAGE OF RAW MATERIALS TO PREVENT INSECT INFESTATION, WHICH ARE EASY TO CARRY OUT IF FORK TRUCKS AND PALLETS ARE EMPLOYED.

1. Raw materials should be stored separately away from the manufacturing section.
2. Returned goods should not be stored with raw materials as the former are frequently infested.
3. Dried food materials particularly liable to infestation, e.g. nuts and dried fruit, should be kept in a separate store.
4. Stacks should be at least 1 ft. from walls.
5. If the floor is liable to be damp, stacks should be raised on platforms.
6. There should be gangways between stacks to allow for proper inspection.
7. Different consignments should be spaced apart.
8. Stacks should be broken-down and re-made at three-monthly intervals.
9. Deliveries of raw materials should be used in strict rotation.
10. Every parcel of goods should be labelled with the date received.
11. Special attention should be given to ingredients, however small in quantity, if kept for long periods.
12. No raw materials should be stored in the manufacturing section of the factory.
13. No more food material to be taken from the store than is needed in the manufacturing section for a single day's work, the excess to go back to store. (In the case of meat and fish, etc., this requirement is of course, much more stringent.)
14. Waste material to be kept in closed containers for disposal as soon as possible.

Handling during manufacture

It is usual to divide handling during manufacture into inter-process handling and handling during processing. For handling between processing there is ample scope in the food industry for an extremely wide range of mechanical handling equipment, including all kinds of mobile trucks, loaders, hoists, conveyors, elevators, lifts, and other equipment. For handling during processing, the tendency is to employ one of two methods:

(*a*) to make use of machines which have in-built loading elevators or throughput conveyors, or which are provided with specially designed (or sometimes, standard) loading elevators; or

(*b*) to link together a number of processing machines by means of a suitable conveyor, and to incorporate various devices which render the whole arrangement equivalent to a complete machine.

An interesting example of a conveyor which links together a number of operations to form a continuous production unit is the use of an overhead conveyor in conjunction with 22 separate operations in a whole bird process installation. This is for carrying out all processes up to freezing, and 1,800 birds per day may be handled. The birds are brought in live in batches of 56 in wire mesh trolleys, which are run right up to the loading point on an overhead rail system. The operations carried out, many of them quite mechanically, are: killing, bleeding, washing, scalding, defeathering, double wax dipping (repeated), wax chilling (repeated), stripping (repeated), hot washing, cold washing, eviscerating, washing, trimming, chilling, inspection, drying, packaging, cartoning. It is claimed that a considerable amount of costly hand labour has been avoided.

A similar principle may be employed for linking manual operations with mechanical operations, particularly where a large number of mechanical operations are carried out in parallel after say, inspection on a conveyor belt. A case in point is the use of a new-type vibrating conveyor for the handling of potato crisps. In this case the conveyor is made in standard sections each about 24 ft. long and 42 in. wide. It is basically of aluminium and is vibrated

(*Turn to page 218*)

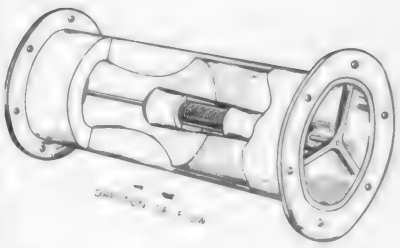


Fig. 1. A valve for maintaining a flow rate of air in a pneumatic conveying line. If the flow rate increases, the spring-loaded plunger is pushed nearer the orifice, thus reducing the flow.

Fig. 2. A modern machine for the automatic filling of small bags with flour. In the background, part of the plant in which the aerating powders are added to the flour can be seen.

HANDLING IN MILLING AND BAKING

By D. G. Elias, B.Sc.

Flour milling was one of the first industries to use mechanical handling, as exemplified by Evans' automatic mill in the eighteenth century. Pneumatic conveying, bulk storage and transport, and mixing and proportioning are examples of modern trends in milling and its associated industry—baking.

THERE is little need to elaborate on the present-day flour milling system, except, perhaps, to mention briefly a number of devices which have been incorporated into the system and are self-adjusting in their operation. For example, the self-balancing feed-gate, a relatively simple mechanical device, has long formed an integral part of a particular operation, and this affords an excellent example of an entirely automatic device.

One of the major changes in flour milling technique has been the introduction of pneumatic instead of mechanical methods of handling and conveying. The new conveying medium has naturally brought fresh problems of automatic control, many of which have now been solved by ingeniously designed devices, such as the air-valve shown in Fig. 1.

Pneumatic handling in place of mechanical handling has also led to the redesign of some conventional machinery.

In all cases, of course, the main aim of the designers has been to render the processing more automatic, less liable to human error, and able to produce a better and more consistent product than before.

Pneumatic handling plants can be classified into two systems; those in which stocks are moved by suction (as in many bulk intake and flour mill plants) and those moving the stocks by blowing. Each class has certain advantages for specific applications and the choice demands considerable study of the overall requirements.

Bulk storage and transport

The second major change to take place in the industry was the mechanisation of the product packing process, of which a typical example is shown in Fig. 2. For many years the largest concentration of labour in a flour mill was employed in the warehouse—and it was, therefore, a practical and logical step to bring in automatic processing at this point.

The bulk storage of the main flour mill products is by no means a new idea, but since the end of the war this process has been developed to a marked degree. It has enabled the miller to make use of high-capacity packing machinery and thus arrange his warehouse labour on a more economic basis, and has resulted in cleaner warehousing with correspondingly better control of infestation. Bulk storage by millers, of course, entails the bulk transport of material away from the mill, and bulk reception by the user. Many installations of this kind have now been completed in Britain, and many more are envisaged. This is hardly surprising in view of the economies which result from bulk stor-

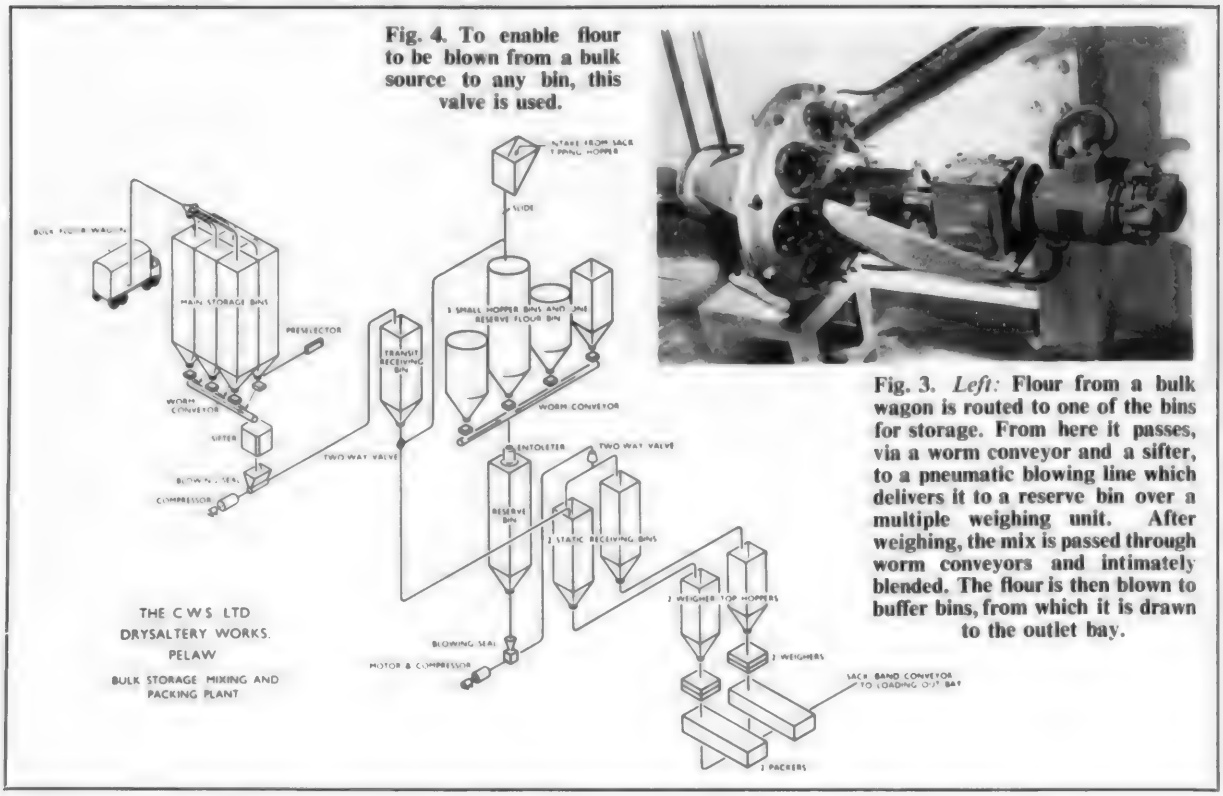


Fig. 4. To enable flour to be blown from a bulk source to any bin, this valve is used.

Fig. 3. *Left:* **Flour from a bulk wagon is routed to one of the bins for storage. From here it passes, via a worm conveyor and a sifter, to a pneumatic blowing line which delivers it to a reserve bin over a multiple weighing unit. After weighing, the mix is passed through worm conveyors and intimately blended. The flour is then blown to buffer bins, from which it is drawn to the outlet bay.**

age in bakeries; it has been shown that for a plant with a storage capacity and weekly usage of 250 tons of flour, the total saving of the bulk system over the sack system in two years' running is over £18,000. A typical layout is shown in Fig. 3.

As might be expected, this has produced new machine requirements, and new devices to meet these needs are shown in Figs. 4, 5, and 6.

Baking

In the bakeries there has been a trend towards automation of the bread and biscuit baking processes, and it would be difficult to find a large or medium sized bakery today which does not use continuous travelling ovens and dough provers. Mixing of the dough, both for bread and biscuit manufacture, is still largely a batch process, but it is safe to forecast that eventually the continuous dough mixer will take its rightful place.

Automatic temperature control has been applied for many years in the dough provers and baking ovens, and in conditioners and other machines in the milling industry.

This type of thermostatic control normally employed is so familiar today that it has tended to lose interest but, as pointed out recently by a well-known bakery scientist, this really represents the first stage of automation in the baking process. An example of the second stage would be the use of an optical device to sense the crust colour of loaves, leaving an automatic oven, which adjusts the temperature accordingly — but even this device would still be subject to time lag wastage, due to the number of loaves actually in the oven at the time the alteration in temperature was made. Thus, the third stage would be the introduction of sensing devices at a previous stage in the process to anticipate the change in crust colour and to make adjustments.

Dough dividing has also been performed automatically for many years, generally by fairly simple volumetric machines, but the British legal requirement that loaves shall conform to certain specific weight values has led to the development of statistically controlled automatic weight limiting devices.

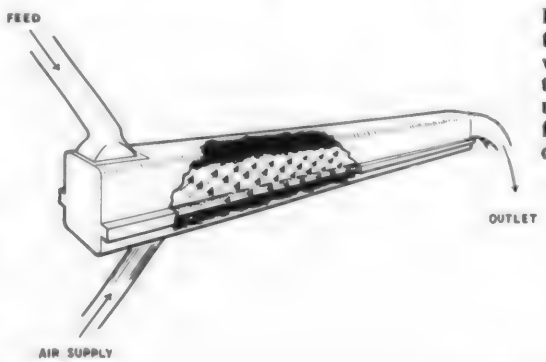


Fig. 5. A porous tile forms the base of this device on which the flour rests. By introducing compressed air under the tile, the flour is fluidised, and in this condition it will flow down a slope of less than 10°.

Mixing and proportioning

For the present, however, it is at the mixing stage that developments are most pronounced—particularly in the manufacture of biscuits, where large numbers of ingredients are often involved with correspondingly large amounts of labour and time. The introduction of automatic proportioning here can be regarded as the outstanding advance in many years.

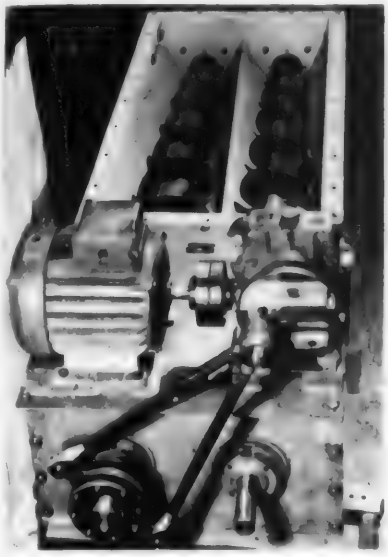


Fig. 6. Another type of bin discharger consists of two tapered, variable pitch worms, geared together in a double troughed steel casing. The speed of the worm drive, and hence the rate of discharge, can be varied by means of the variable throw eccentric, which is coupled to a double roller-ratchet assembly.

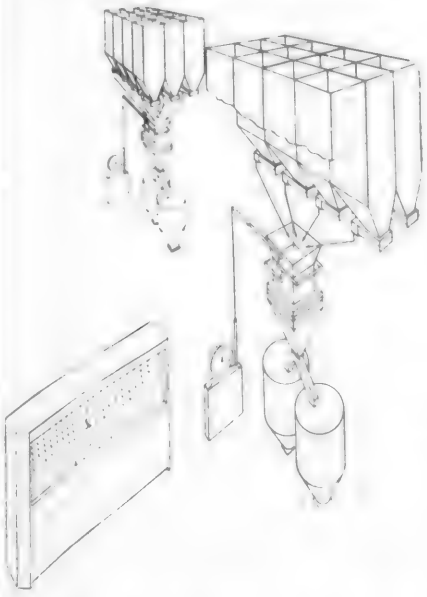


Fig. 7. The ingredients in the bins are feeding into the hopper of a weigh pan, which is connected to the scale head. The readings of this head are transmitted to the panel.

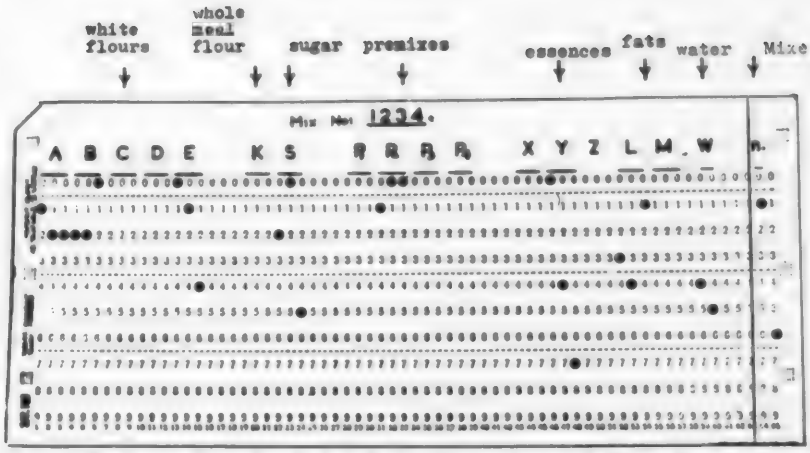


Fig. 8. This punched card can be used to initiate and control a biscuit dough mixer. The number and quantity of white flours used are shown in rows A-E, sugars in row S, pre-mixes in rows P1-P4, essences in X-Z, fats in rows L and M and water in row W. The mixing operation itself is controlled by the position of the holes in the last column. Such a card process can be used many times and secrecy of formulae is ensured.

It might be useful, at this stage, to consider such an installation in detail. A number of bins, each discharged by an electrically controlled feeder, have their outputs directed into a common weigh pan. Connected to this weigh pan is a scale head, the readings of which are transmitted electrically to a control panel. The controls can be pre-set to the desired quantities of each material in the bins. When all the ingredients have been added the weigh pan discharges the mixture automatically to the next part of the process, and then repeats the operation as often as is desired. This is illustrated in Fig. 7.

The scale head settings at which the various ingredients are caused to cease flowing are pre-set, in the examples shown, by the manual operation of an appropriate number of dials on the control panel, but even this operation can be performed automatically by the use of punched-card mechanisms.

Furthermore, it is not merely the formulation of the mixture which can be controlled in this manner, but also the routing of materials and the timing of the processes. Thus, a complicated ingredient formula, an equally complicated processing system, and a required number of cycles of operation can be reduced to a number of holes in a card such as is shown in Fig. 9, which can then be used to initiate and control the entire process.

This system is not confined to the biscuit trade, of course, and it is already finding wide application in the production of animal feeding stuffs, the manufacture of rubber goods, fertiliser production and many other industries. In the examples given earlier, only batch processes have been shown, but there would be little difficulty in applying systems of this type to continuous processes by the use of suitable weighing devices.

Future trends

Recent developments and trends can be summarised as follows:

Flour milling—
- Pneumatic conveying.
- Automatic sampling.
- Bulk storage and delivery.
- Better quality control.

Baking—
- Bulk intake.
- Automatic proportioning.
- Automatic process control.

It is always difficult to prophesy future trends, but it can be inferred that, apart from the redesign of machinery, the next stage

towards automation in flour milling is two-fold: firstly, the development of continuous methods of quality testing; and secondly, the coupling of these methods, by means of suitable servo-mechanisms, to the process itself, so that true automatic control is achieved.

In closing, let me quote a hypothetical case from outside the flour milling and baking industries. The end products of the animal feeding stuffs industry in Britain have to conform to certain analytical standards of protein, fibre, carbo-hydrate, etc. These products may be produced from as many as 30 ingredients—the exact formulation depending on the chemical composition of the ingredients, their availability, the prevailing price and a number of other factors.

The working out of a suitable formula is, therefore, a lengthy and complicated process — and already electronic computers have been employed to carry out this stage of the process. It does not require much imagination, therefore, to visualise the final stage of this development—the coupling of the computer to the automatic proportioning system and the process control—thus yielding the truly automatic industry.

(Based on a lecture to the Deutsche Müllerei Tagung, Detmold, Germany, and published by arrangement with *Automation Progress*, Leonard Hill, Ltd.)

FACTORY LAYOUT AND MATERIALS HANDLING

(*Concluded from page 214*)

by means of a new type of motor-driven vibrating unit which incorporates a rotating out-off balance wheel and hydraulic damping to prevent shock when starting up. Among advantages claimed for the conveyor are reduced maintenance costs, gentle handling of fragile items, silent operation, versatility —permitting it to be used as a cooling unit—easy adjustment and easy cleaning. The crisps are delivered from the cookers and salters on to two points on a waist-high section of vibrating conveyor. They are passed over a wide mesh cooling conveyor and inspected. Then they go up an inclined section to a ceiling-level vibratory conveyor, which delivers the crisps to seven sets of filling, weighing and packaging machinery, via seven valves and hoppers. Each valve is operated by means of a gentle jet of filtered air, and is sensitively controlled by a remotely operated switch. A short return length of vibratory conveyor handles any overflow, returning this to a point back along the main conveyor.

Under test at the present is a multi-tier version of this vibratory conveyor, arranged to permit cascading from one level to another. This is to be fitted with infra-red lamps for the heat processing of peanuts, etc. When used as an inspection table the vibratory conveyor is fitted with vibration-free hand rails. It is stated to be suitable for handling fruits and vegetables, for size grading and washing, and particularly for use in freezing plants where it can act as both inspection table and feeder.

▶ Self-cleaning air filters for handling large volumes for long periods are dealt with in an illustrated brochure published by the Visco Engineering Co., Ltd. There is also a brief description of other types of air filter.

▶ Chains of one sort or another are an integral part of almost all types of machines. An illustrated brochure by Renold Chains, Ltd., shows the application of different kinds of chains in different types of machinery and conveyor systems.

▶ A folder containing leaflets describing their full range of industrial electronic equipment is being issued by Airmec, Ltd. The folder is in loose-leaf form and new information will be forwarded to users from time to time.

▶ Mechanised punched card operations in a fruit cannery in Australia are reviewed in the Hollerith Co.'s *Tabulator* (No. 94). Accounting at this cannery—which is the largest in the Southern Hemisphere—is all done on Hollerith machines.

BIN SYSTEM

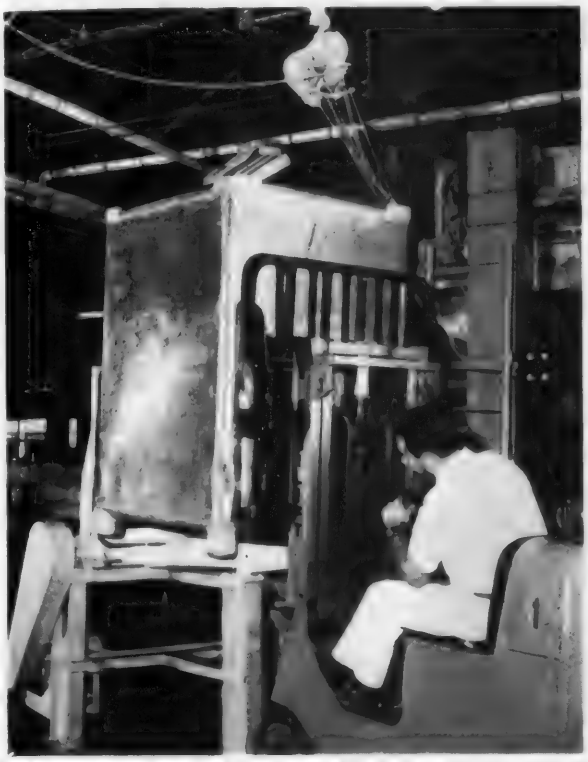
THAT no less than $55,000 will be saved annually by changing over to bulk handling methods for sugar and flour is anticipated by Burry Biscuit Co., of Elizabeth, N.J., U.S.A.

Hitherto, purchases of both sugar and flour have been made in 1 cwt. bags, but for a bakery that consumes 38,500 lb. of granulated sugar daily for frostings and fillings and 100,000 lb. of flour daily, this has proved too expensive. The bags cost 12 to 14 cents each, and labour costs for loading, unloading, storing, transporting and emptying them are considerable, as are also the costs of handling the empties. Furthermore, although normal losses from pilferage, spillage and contamination of bagged sugar and flour are small, they add up to an appreciable amount at the end of the year.

To cut costs the Burry Biscuit Co. have installed the Tote system at their Elizabeth plant. It comprises 25 Tote bins. Made of light-weight aluminium, these hermetically sealed bins resist corrosion and damp and are capable of handling 3,500 lb. of sugar each. They can be used for transporting, storing and, with the use of a special Tote tilt, for discharging hoppers.

When used as transport containers, they can be lifted off a flat bed truck or any flat vehicle, without pallets, by fork lift, and the railway companies in the United States are, in fact, now making available special container cars which make possible the charging of special rates for Tote bins. In storage, they can be stacked one upon another, but even placed in one-bin height rows they cut the requirements over palleted bagged sugar by about 15%. As discharge hoppers operating by means of the tilt, they make possible the easy transfer of the material through a low front aperture when the seal has been broken. Spillage during discharge is eliminated.

CUTS BAKERY HANDLING COSTS



Left: **A bin being placed on the tilt by fork lift truck. On the bin being inclined to 45° and the seals broken, the contents—3,500 lb. of sugar—pour on to a conveyor system feeding the bakery.** *Right:* **Sugar being checked as it discharges from the bin on to the screw conveyor to be carried to the surge hopper.**

From Elizabeth, the Burry Company transport their own empty bins to the New York City sugar refineries and return loaded. The same bottom trucks are used as previously transported the bagged sugar, but now a bulk discount is received. Previously, it took at least two men at least 2 hr. to load a truck with bagged sugar. It takes one man only 15 min. to load the same quantity in Tote bins. A similar saving is achieved on off-loading at the biscuit factory, a fork lift taking the eleven bins per load from the truck. The work of fetching a load of sugar has, in fact, been cut by half.

Where, formerly, the sugar was dumped, bag by bag, into the baking machinery, this is now done mechanically, the bins being lifted by fork truck on to the tilt in the warehouse area and inclined to a 45° discharge position. The 3,500 lb. of sugar then discharges through a Fuller conveyor system, passing through a screw conveyor to a surge hopper, from which a bucket elevator carries it into a pulveriser and thence to the baking process. Checking takes place as the sugar is discharged. The empty bin is taken from the tilt by fork lift and is replaced by another. The entire process takes less than ½ hr. The empty bin can be resealed so as to ensure maximum cleanliness.

This system offers more flexibility than most bulk handling systems.

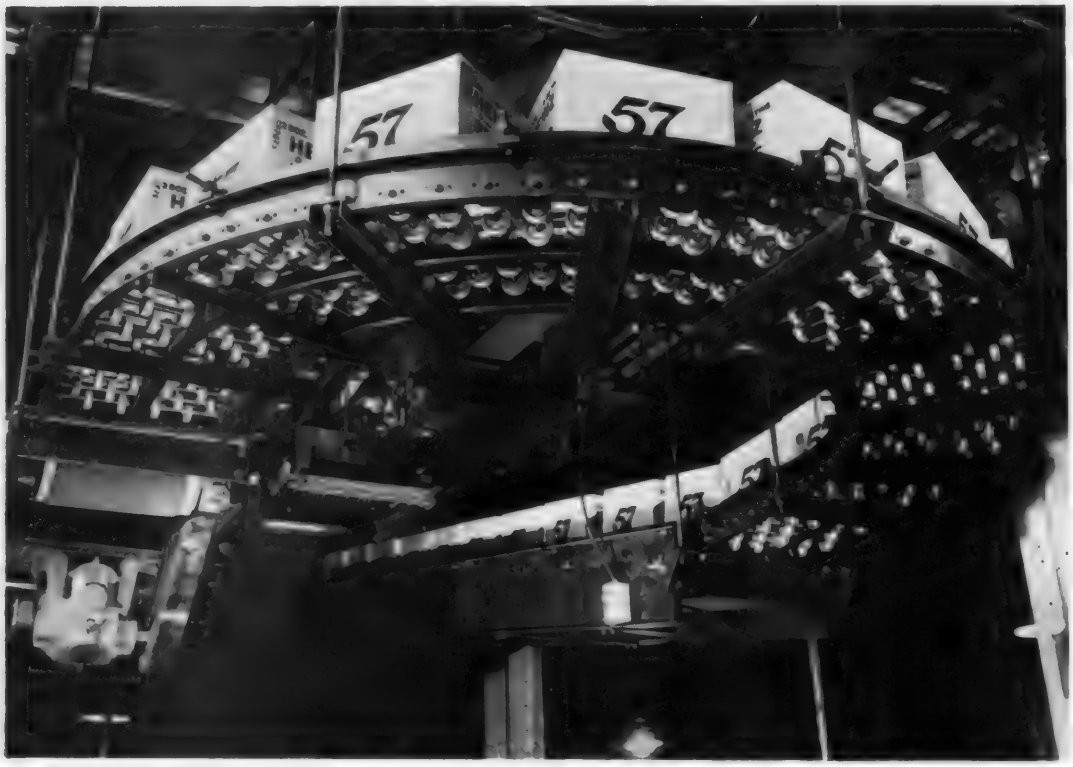
For the handling of flour, 100 more bins are to be installed and two extra tilts. In addition, for transporting the flour to the plant from the millers, eight Airslide bulk hopper cars will be put into use. On arrival of the hopper cars at the bakery siding, the flour will be transferred by conveyor to the Tote bins in the warehouse area, filling two at a time, and, by means of automatic cut-offs, moving over to two other bins when these are filled. A Fuller pneumatic system will be used to carry daily 140,000/160,000 lb. flour from the Tote tilts into the baking process in the adjoining room.

Anticipated annual savings are:

Sugar		
Elimination of bags at $46.20 to $53.90 per day = (minimum)	$12,012	
Labour	4,500	
Sugar total (minimum)		$16,512
Flour		
Elimination of 1,000 bags a day at $120 per day	$31,200	
Labour	7,000	
Flour total		$38,200
Sugar and flour total		$54,712

The Tote System has now been introduced to Britain (see p. 240).

JOHN GRINDROD.



Courtesy H. J. Heinz

Remotely controlled conveyor for packages.

ELECTRONIC AIDS TO MECHANICAL HANDLING

By Leo Walter, A.M.I.Mech.E.

Electronic devices are the brains of mechanical handling equipment. Here are some examples of how these devices are being used to improve handling machinery for the food factory.

DEVELOPMENTS in electronic valves, in transistors and magnetic amplifiers have widened the use of electronic control in mechanical handling in recent years.

Electronic valves

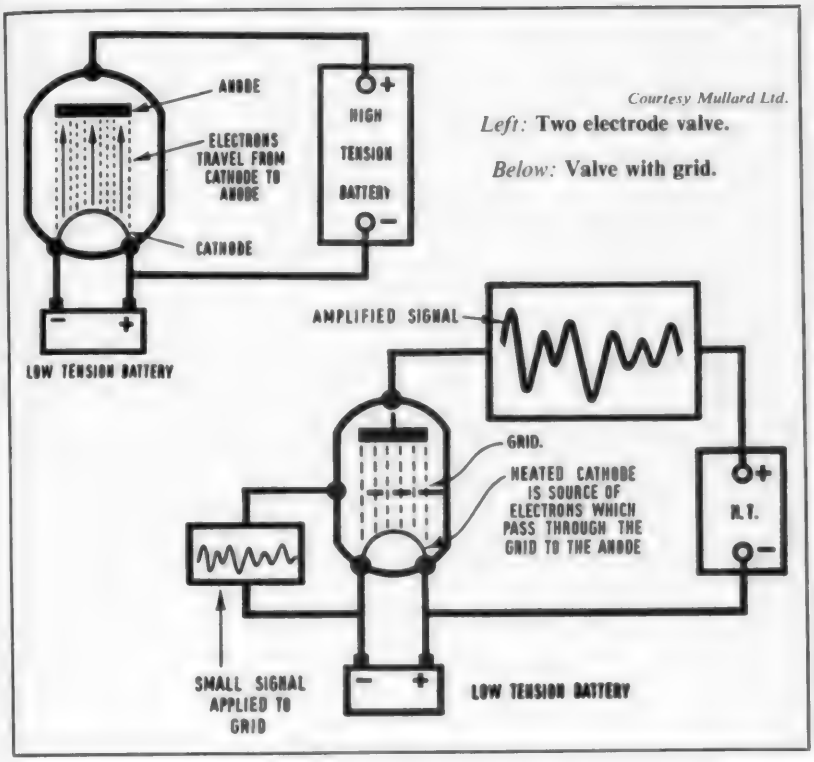
Electronic valves make use of the actions of electrons in gases to magnify minute electric impulses, used as input, for output purposes. This electric output can be used as a powerful electric current for measuring and/or control in conjunction with electronic relays. There are many types of valve for electronic controls, *e.g.* small general purpose valves with voltage amplifying qualities; larger voltage amplifying pentodes, triodes and double triodes; output pentodes; small rectifiers indirectly heated; cathode ray tubes; flash tubes for stroboscopes, etc.; photocells; image converters; thyratrons; modulators and power triodes; tetrodes and double tetrodes; and power rectifiers.

Timing and counting devices

Timing devices are now widely used, for example in connection with an electronic relay to operate an electric switch, a motor starter, a magnetic or motorised valve after a set interval. Very accurate timing can be achieved by employing a controlled crystal oscillating circuit. Output from conveyor production lines, and the feeding of machines can thus be controlled. New electronic counters operate at enormous speed and are most useful in research.

Pick-ups

Electronic relays in combination with a converter can be used for switching, regulating, grading and weighing. A "pick-up" device is used to react to a certain phenomenon, resulting in a change of electrical tension, which latter activates the electronic relay. The simplest form of such a pick-up is a device for making or breaking a contact.



Courtesy Mullard Ltd.

Left: **Two electrode valve.**

Below: **Valve with grid.**

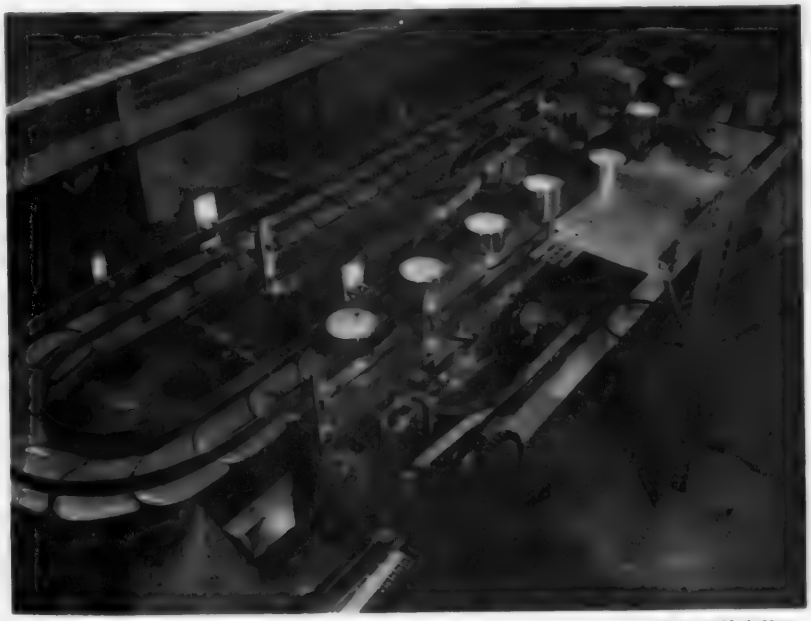
An electronic device which is a form of pick-up is the electronic load cell which may be used for weighing. The weight causes a deformation of a detecting element and thus varies electric current proportional to the load (weight of goods). This current variation can be indicated or recorded on an instrument calibrated in units of weight.

Electronic weighing devices

The Solartron Electronic Group has developed two weighing appliances in association with Scribbans-Kemp Research and Development Ltd. Though at present these devices are limited to loads up to 70 oz., the makers make remarkable claims for speed and accuracy, *i.e.* speeds up to 60 weighings per minute and accuracies better than 0·2% at the maximum nominal capacity. This has been achieved by the use of an electro-electronic servo-mechanism whereby a very slight movement of the weighing head brings into force a counterbalancing electro-magnetic effect of precisely adequate value; it is this counterbalance force which is indicated. Obviously closely stabilised components and circuits are employed. Because of the very slight movements involved the effects of inertia and of frictional resistance, both formidable in high-speed mechanical weighing, are greatly reduced.

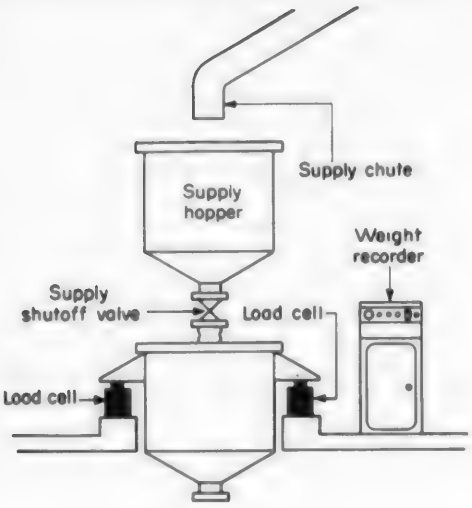
The new devices, known as "Solarchecks," are built into appliances suitable for use by the unskilled operator and are intended for production lines or semi-automatic sequences. They are available as mobile self-contained consoles, with the weighing head inserted in the top. The console has, as standard, green, red and amber lights for routing, and counters for recording the quantities of "correct," "underweight" and "overweight" packages. No springs, pivots or knife-edges are used in the construction of the weighing head; the very few sleeve bearing surfaces in contact are made from tungsten carbide. Nominal-weight and weighing-range adjustment controls are contained in a locked compartment. Easy access is provided to all test points, by arranging the control units on a hinged frame, so that routine maintenance is facilitated. Units such as that for the power supply and the weigher control amplifier are standard to all models, and each may be replaced in a few minutes.

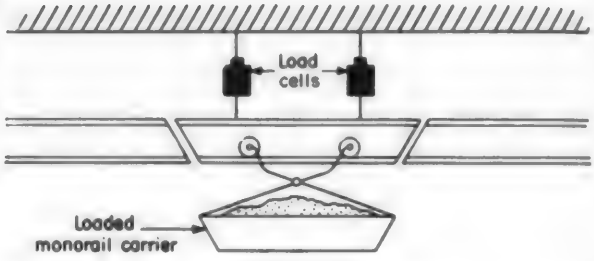
In model 631, the console is transportable. In model 630 the weighing head is designed for incorporation into production lines, and the control box and display head are separately mounted. In both cases the power require-



Courtesy H. J. Heinz

Filling of cans tested by radio-active source and photocell system.





Left above: **The supervisor selects pallet loading pattern by push-button.**

Right above: **Hopper weighing using electronic load cells.** *Below:* **Monorail conveyor weighs load using load cells for suspended rail section.**

ments, around 200-300 W, can be taken from either 90-130 V or 200-240 V supplies at 50-60 c.p.s.

A very specialised but now widespread use of electronics is precise motor speed control. It is understandable that the food industry in general is paying increasing attention to electronic control of motor drives, because maintenance of accurate speeds has become more important since continuous processing at greatly increasing speed has been widely introduced into manufacturing processes.

Photo-electronic devices

Light-sensitive photocells in form of electronic relays are being increasingly used for the handling of foodstuffs. The latest photocells allow counting, batching, grading and sorting, ejecting, inspecting and sorting, and many more operations to be performed fully automatically. A number of British-made photo-electronic devices are available, all consisting of (*a*) a light-source, producing a light beam, (*b*) a receiver, containing the photocell, and a relay for magnification of current, (*c*) auxiliary devices.

Used for protection of conveyors against jamming, the sender unit is installed so that any accumulation of boxes or crates on a conveyor band would interrupt the light beam. The photo-electronic relays thus cuts out instantly the conveyor motor and

Courtesy H. J. Heinz

Switching control centre weight operator directing cases from 12 accumulating conveyors to one of four trunk line conveyors.

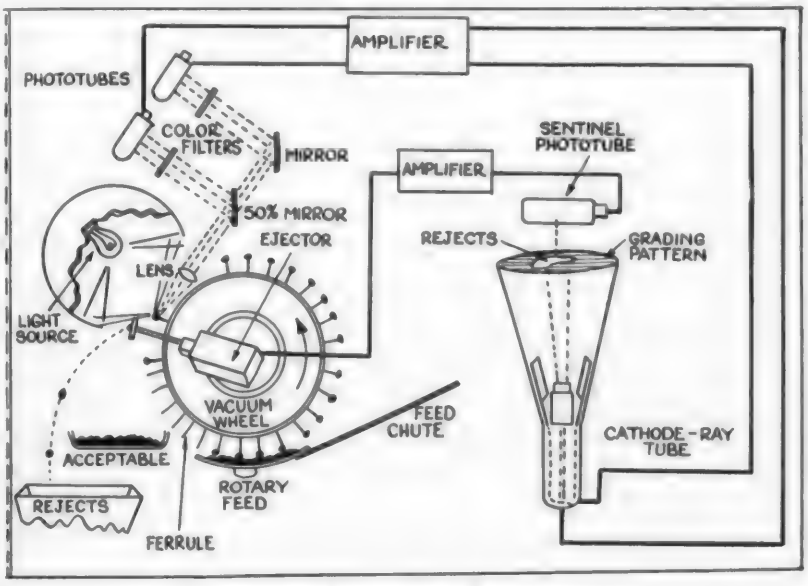
feed, until the obstacle is being removed.

Another use of photocells is in print registration of wrapping material during printing. For example, when printing wrapping paper rolls any movement aside of the incoming paper web would be immediately detected by the light beam and automatically corrected. In multi-colour printing photocells are used to ensure exact matching of the various colour prints.

From the many automatic sorting machines available, one type of bean-sorting machine is remarkable due to its precision and speed. The machine does the job by comparison of size, shape and colour, and ejects automatically all beans below a certain standard. An electronic cathode ray tube is used for the grading pattern (shape and size). Two electronic photo-tubes are applied for comparison of colour of the beans during sorting with a desired colour standard. A vacuum wheel turns round, and any sub-standard coloured bean is automatically seized by an ejector. The acceptable beans fall on a chute and roll on to a conveyor.

Courtesy G.E.C. Ltd.

G.E.C. photocell unit "watching" flow of the packages on conveyor bands.



Bean-sorting machine using photo-tube.

The use of electronics in labelling and packaging is now widespread in the food industry. An interesting combination of isotopes with electronic photocells has been developed by H. J. Heinz Co., Ltd., in their well-equipped experimental shop at Harlesden (London). As is well known, one trouble that occasionally occurs in filling of cans is that, for one reason or another, one can may not be quite filled. Once the can has been sealed there has been no certain method of detecting that it is not full. The experimental filling testing machine works as follows.

As a filled and sealed can moves along a conveyor it interrupts a light beam focussed on a photo-sensitive selenium cell. A low-intensity and harmless radioactive source is used to send gamma-rays in form of an invisible beam. As the light beam is interrupted the photo-cell relay trips a Geiger counter. If the can is full most of the gamma-rays beamed through the top of the can are absorbed. If the can is only fractionally under-filled the gamma-rays will pass through and the Geiger count increased. The impulses are amplified, and by means of a relay system a compressed air cylinder pushes the can off the conveyor.

Centralised control of mechanical handling

Much has been written and said in recent times about "automation" and "automatic handling." The new Pittsburgh factory of the American Heinz company comes near to the ideal of mechanical handling of packaged foodstuffs. It has a warehouse capable of receiving, storing and shipping 48,000 cases during an 8-hr. shift. Key operating principle of the three-storey building is automatic handling—from case sealing to storage to movement of goods to the shipping docks. Nerve centre

(*Turn to page 235*)

Standardisation and Operation of TENDEROMETERS

By R. W. Graham, B.Sc. and G. Evans, B.Sc.*

The quality of green peas is now controlled extensively by the tenderometer. The use of this ingenious machine, however, raises several problems, the most important being standardisation. Here the authors discuss their own approach to standardisation and describe the use of quick frozen peas as a reference standard.

THE tenderometer is now being widely used to determine the texture of green peas for quality control purposes. It is also being used by most packers as a basis for bonus payments to farmers. The various problems involved, of which the most important is tenderometer standardisation, are discussed. In the absence of suitable artificial reference materials for absolute standardisation, Unilever Limited have developed a technique using specially prepared batches of frozen peas whereby the tenderometers at the factories are standardised against a Master tenderometer.

Experience in operating tenderometers in the field is discussed, and the use of chilled raw peas transported in Dewar flasks is described as a means for regular checks to maintain agreement between a number of tenderometers during the pea season.

The tenderometer can only be operated efficiently if the peas are adequately washed to remove foreign matter which would damage the grids. The grids should also be washed frequently to remove adhering material which would affect subsequent readings.

Efficient operation is also dependent on the "daily pointer check" as described in the Tenderometer Service Manual of the Food Machinery and Chemical Corporation.

To obtain first quality green pea packs the peas must be harvested at optimum maturity for quick freezing and canning respectively. In order to do this consistently a convenient objective method for the measurement of maturity is desirable and is in fact essential if *pro rata* bonus payments for quality are made to farmers.

The determination of the alcohol-insoluble solids content of peas (A.I.S.) is an accurate method for assessing maturity. However, it involves a time-consuming analytical technique and has therefore no practical application as a production control test. The tenderometer, manufactured by the Food Machinery and Chemical Corporation in the U.S.A. and now being manufactured under licence in Canada and Belgium, appears to be the most useful instrument yet devised for rapid texture tests with peas and can be made to fulfil the requirements outlined provided certain precautions are taken. The tenderometer has been in general use in the U.S.A. since 1937 and in this country on an ever-increasing scale since 1946.

The use of the tenderometer has raised a number of problems, the most important of which concerns standardisation. This paper discusses tenderometer standardisation methods, the necessary precautions for satisfactory operation and describes the use of quick frozen peas as a reference standard.

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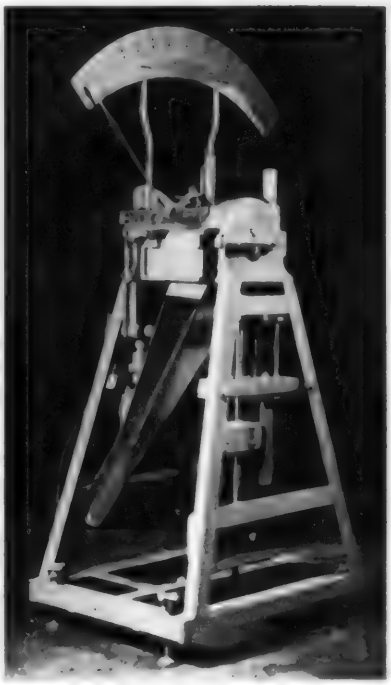

Fig. 1. The tenderometer.

The tenderometer and how it works

The tenderometer stands about 5 ft. high, weighs about 7 cwt., and is power driven (Fig. 1). Its essential part is the "mashing grid" (Fig. 2), consisting of rectangular-edged interlocking metal shearing plates which have a clearance of about 0·002 in. between the plates when the grid is closed. When the two portions of the grid are fully disengaged a chamber is formed which holds about 6 oz. of raw peas. The upper section of the grid is connected to the motor *via* a cam mechanism and worm drive and is put in motion automatically as soon as the cover of the instrument is closed. The base of the lower grid section is attached to a shaft (1 in. dia., $2\frac{1}{2}$ ft. long) carrying one, two or three counter weights. The lower grid

section is also connected to an angle piece which actuates the pointer. As the lower section of the grid rotates, this pointer actuating angle moves the pointer over a scale which is calibrated in three ranges (0-50, 0-200 and 0-250) to accommodate various vegetables of different textures. It should be noted that these scales are not linear. The maturity range of peas lies in the 0-200 scale when two counterweights are used.

In operation the upper grid is set in motion and the peas are crushed between the shearing plates; this forces the lower grid to rotate and raises the counterweight. The force required to shear through the peas is represented on the scale by the angle through which the pointer has been turned by the movement of the counterweight shaft. The final position of the pointer on the scale gives the "tenderometer reading or value" of the peas.

The nature of the forces acting within the tenderometer is not fully understood. Some of these forces are concerned with the resistance to shear of the peas, the friction between the peas and the grids and the viscosity of the crushed material. Attempts have been made by several workers to provide artificial reference materials for absolute tenderometer standardisation. Cigarettes, filter papers, foils, gels and plastics have been tried. These materials have all been unsuccessful because they do not exactly simulate the behaviour of peas on being crushed between the grids of the tenderometer. Our experience with foils and plastics has shown that if two or more tenderometers are in agreement on testing peas they will not necessarily be in agreement with standard samples of foil and plastic.

Standardisation methods

The Food Machinery and Chemical Corporation describe a procedure for Tenderometer Standardisation and a method for checking the correct position of the pointer in their service manual.[1]

Standardisation involves balancing the moment of the counterweight rod and weights in the horizontal position against the moment of a standard weight, using the grid spindle as the fulcrum. This method is entirely mechanical and it is quite unreliable when the grids are either slightly worn or distorted; this view has been confirmed in the U.S.A.[2] We assume that it is for this reason that F.M.C. advocate the return of all tenderometers to them periodically for overhaul and re-calibration. This is expensive and not altogether practicable on a large scale from this side of the Atlantic. Worn or distorted grids should be replaced and for this we advocate that tenderometer users should keep a stock of spare grid assemblies. After fitting a new grid assembly the tenderometer must be standardised against a Master tenderometer by the methods described in this paper.

The checking of the correct setting of the pointer should be carried out at least once a day according to the F.M.C. service manual. We have found that one of the most common causes of tenderometers going out of adjustment is incorrect setting of or damage to the pointer actuating angle. It is therefore essential that the pointer setting is checked very carefully each day and a stock of spare pointer actuating angles kept in readiness. This is a very simple spare part in mild steel which can easily be made in the fitting shop.

Owing to these difficulties tenderometer users have been largely thrown on their own resources to devise means to ensure that their tenderometers are maintained in agreement with each other and with new tenderometers which are "standardised" by the makers before a delivery.

A method of standardisation[3] was developed in the U.S.A. which relied upon test peas stored in alcohol as the reference medium. Test peas of given tenderometer reading were issued by the F.M.C. to tenderometer users with instructions for use. This procedure was in general use in the U.S.A. for a number of years and was approved by the Research Laboratory of the National Canners' Association, but its use was discontinued in 1951[4] because its reliability under field conditions was suspect. The shortcomings which lead to this decision were mainly concerned with the discovery that slight variations in technique and temperature caused considerable variations in the readings. Also, peas in alcohol toughen increasingly on storage and extremely rapidly on exposure to air after the alcohol is removed.

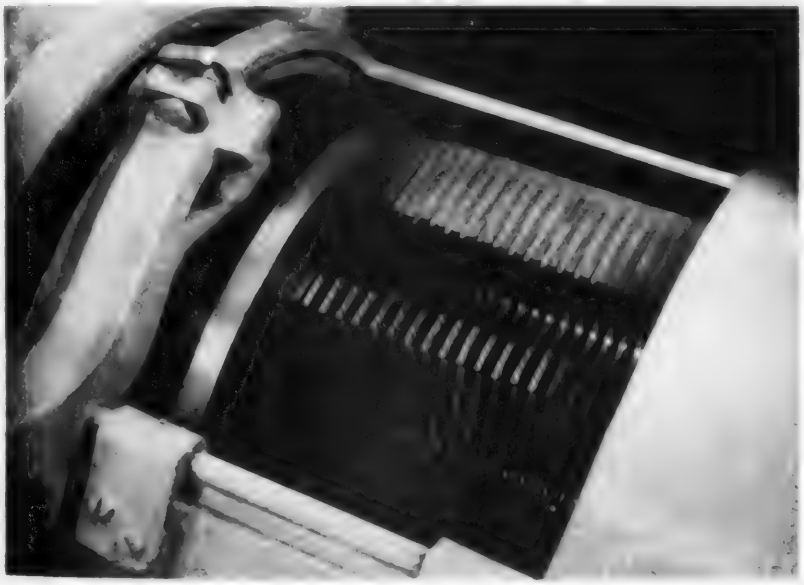

Fig. 2. "Mashing grid," the essential part of the tenderometer.

One of the writers discussed tenderometer standardisation problems with one of the largest quick freezing concerns in the U.S.A. and also the system they have developed for checking tenderometers in the field against a Master tenderometer. Their procedure is briefly as follows:

(1) Size grade a small batch of raw vined peas and wash the largest fraction in cold soft water.
(2) Mix the washed peas thoroughly, fill into large Dewar flasks and cover with ice cold soft water. It is important to use soft water as hard water toughens the peas.
(3) Transport the flask to the tenderometer sites, retain in one flask as a control sample at headquarters.
(4) Carry out simultaneous tests in the field and on the Master tenderometer communicating results by telephone. Sufficient peas are supplied for re-testing after tenderometer adjustment in the field, should this be necessary.

These tests (4) usually consist of taking the average of at least ten separate readings on each tenderometer. Within a series of ten readings, variations of up to 10 tenderometer units may be expected. A similar procedure was used by Unilever in 1955 and 1956 to augment standardisation tests carried out with specially prepared batches of quick frozen peas. The use of quick frozen peas for tenderometer standardisation is described in this paper.

Various workers have shown that there is a high correlation between the alcohol-insoluble solids content of peas and the tenderometer reading. Suggestions have been made that this relationship might be used as a means of absolute standardisation. However, most of this work was done in connection with one machine on one variety of peas in one season. There is no doubt that the correlation claimed between alcohol-insoluble solids and tenderometer readings does exist and is of the order of 0·97. We have shown, however, that the regression lines plotted on this basis for different machines and different varieties are by no means identical and therefore the method cannot have general application.

Quick frozen peas as standard test material

A large and increasing number of tenderometers are used within the Unilever concern. It became evident as early as 1950 that some internal standardisation or checking system was necessary to ensure that all the machines within the concern were maintained in good agreement. It was decided as a first step to accept the tenderometer in this Department as the Master machine. This machine was received from F.M.C. in 1950 as standardised, has been carefully maintained ever since and has suffered little wear as compared with the factory tenderometers. Subsequent tests against new F.M.C. tenderometers as these arrived showed that the Master was still in adjustment after four years.

In view of the uncertainty of the peas in alcohol procedure and the maker's mechanical method already referred to, it was decided in 1950 to investigate the use of quick frozen peas as test reference material.

Preliminary work indicated that peas thawed overnight in a chill room and then held at 37°C. for 5 hr. provided promising reference material. At this temperature controlled storage for 5 hr. was necessary because under these conditions tenderometer readings decreased with time, reaching a minimum in 5 hr. (see Fig. 3). The minimum value persists for some time after 5 hr., which allows some latitude in the exact testing time. The conditioning temperature of 37°C. was chosen for convenience since this temperature is in general use for routine incubation tests on canned foods. Other temperatures have not been tested.

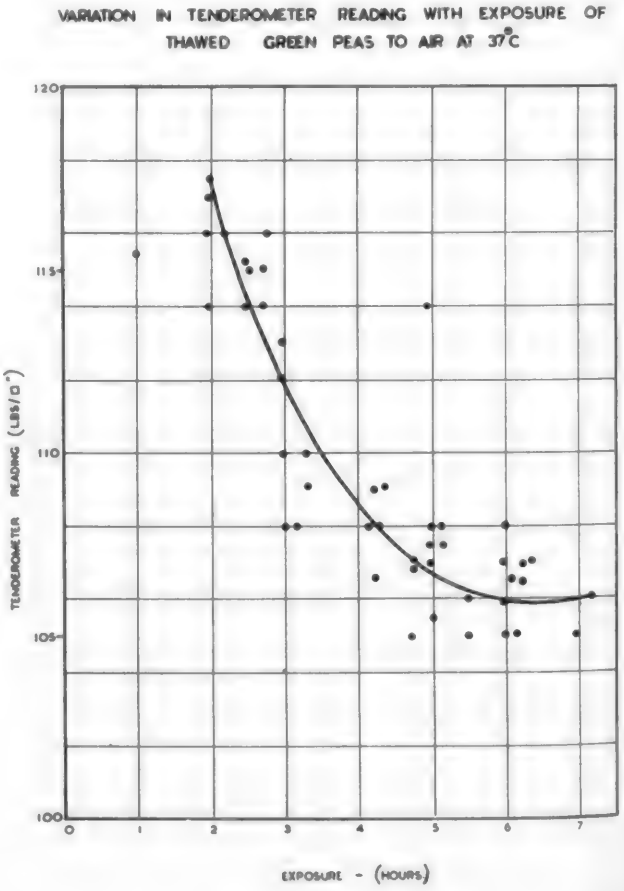

Fig. 3.

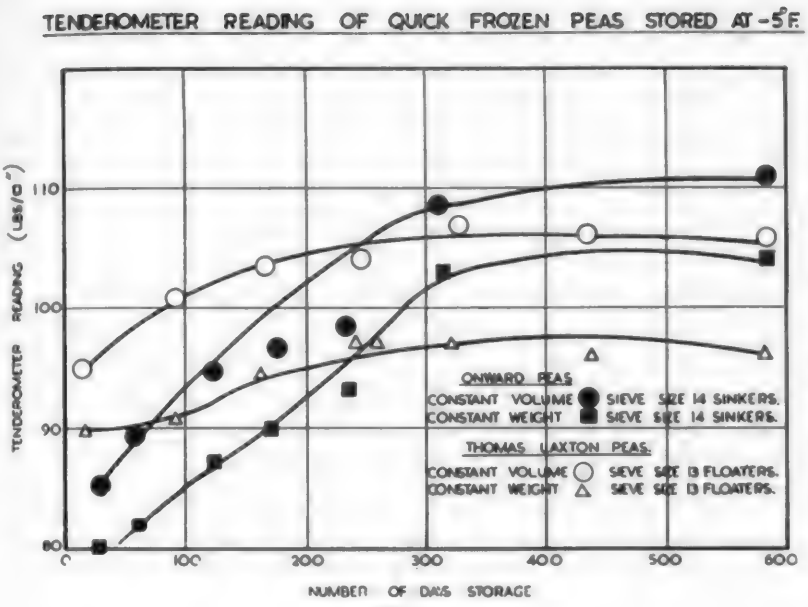

Fig. 4.

When the intial tests were made in 1950-51, it was not known whether the texture of the peas changed with storage or whether different varieties had different storage characteristics. These points were subsequently checked with the varieties Canner 99, Onward and Thomas Laxton. The conclusions from these tests were (1) that frozen peas toughen slightly until they reach a maximum after which they remain fairly constant (see Fig. 4), (2) that Thomas Laxton appeared the most suitable for use as the standard material (more recently Dark Skinned Perfection has been found to be equally suitable) and (3) that more consistent results were obtained by using a constant weight sample of 5 oz. for testing rather than the normal procedure of filling the tenderometer grid space to approximately constant volume.

Preparation of test peas

Raw peas from the viner, preferably in the tenderometer range 120-130 are cleaned, washed and size graded. Thomas Laxton or Dark Skinned Perfection peas of sieve size greater than 11/32 in. diameter are used for preparing the standard samples. It is convenient to select the raw peas at such maturity that the sieve sizes chosen have a raw pea tenderometer value of 130-140. This ensures that after blanching, freezing, storing and thawing under controlled conditions the floaters will have a tenderometer value of 80-100 and the sinkers 95-110. The best uniformity within each specially prepared batch of peas is obtained by limiting the size of each batch to 50 lb.

The sieved peas are again washed in cold mains water, blanched in water at 210-212°F. for 1½ min., cooled and then separated in brine (35° Sal.).

The blanched and quality separated peas are then packed in standard 12 oz. cartons with cellulose film liners and waxed paper wrappers, quick frozen and stored at 0 to −5°F. until required for testing.

Procedure for testing

(1) Remove sufficient cartons of peas for six tests per tenderometer from the cold store and leave in the air lock or chill room overnight (about 40°F.). One carton will give sufficient peas for two tests.

(2) Remove the peas from the cartons on the morning of the test, separate the peas by hand and mix thoroughly in a container.

(3) Place the peas in sample tins, the volume of each tin being approximately equal to the volume of the tenderometer grid space (8 oz. cans are suitable).

(4) Place the tins in an incubator maintained at 37 ± 0·5°C. and leave for 5 hr. A tray containing granulated calcium chloride should be placed in the incubator to remove the excess moisture from the air.

(5) Remove the peas from the incubator one can at a time, weigh out exactly 5 oz. and then test on the tenderometer. It is advisable to flush the grids with mains water before each test.

This procedure is lengthy and does not lend itself to spot checks or emergency recalibration tests during the pea season. Recent work has shown promise that this can be overcome by quick freezing the peas in 8 oz. cans instead

Table I. Standardisation of Factory Tenderometer No. AM 689.

	Tenderometer Readings					
Test Peas	*Master Machine*	*Av.*	*Factory Machine*	*Av.*	*Remarks*	*Action*
Dark Skinned Perfection Batch "A"	86,88,88 86,88,89	87	80,80,83 81,81,82	81	Low	Retest
Dark Skinned Perfection Batch "B"	85,81,84 82,83,82	83	78,78,79 80,79,78	79	Confirmed low	Raised big weight ½ in. Retest.
Dark Skinned Perfection Batch "B"	86,82,84 82,81,82	83	81,79,80 81,82,80	80	Still low	Raised big weight ½ in. Retest.
Dark Skinned Perfection Batch "C"	90,86,87 85,84,86	86	85,88,85 88,85,82	85	One point low	Retest.
Thomas Laxton Batch "D"	89,91,94 94,90,96	92	94,87,93 95,100,94	93	One point high	Passed.

of cartons and rapidly thawing them in a thermostatically controlled water bath at 90°F. The peas are ready for testing 2½ hr. after removal from storage at 0°F.

Six readings should be taken per test and if the average differs by more than ±2½% from the Master tenderometer, adjust the weights accordingly and retest. The tenderometer must not be corrected by bending the pointer actuating angle as this will vitiate the daily pointer check test and the error thus introduced is a variable one since the scale is not linear.

Example of standardisation

A typical sequence of tests during standardisation of a factory machine in 1955 is shown in Table 1.

Another example illustrating the use of specially prepared frozen peas as reference material concerns a batch of six tenderometers received from our factories for overhaul and standardisation before the pea season. After they had all been brought into agreement with the master tenderometer in the same way as machine No. AM 689 in Table 1, they were retested simultaneously against each other with one batch of specially prepared frozen peas. The readings obtained are shown in Table 2.

This table illustrates the close agreement that can be obtained between tenderometers used in the field and the Master tenderometer by following the above procedure.

This procedure is now established as a routine method to maintain agreement between forty tenderometers in the field. A *pro forma* sheet is used for recording the condition of the machine and state of the grid before standardisation, the tests, and the adjustments made, and on the reverse of the form the position of the weights before and after standardisation are shown (see Fig. 5).

Table 2. Tenderometer readings of six production machines after standardisation against Master machine with a specially prepared batch of quick frozen peas.

Machine	*Tenderometer Readings*	*Average*
MH 391	95, 95, 95, 96, 94, 96, 94	95
MC 360	98, 94, 98, 100, 97, 97	97
MC 359	92, 94, 98, 96, 96, 94	95
AO 626	95, 95, 96, 94, 95, 95	95
MS 557	94, 95, 97, 94, 96, 94	95
MH 390	98, 94, 95, 97, 96, 95	96

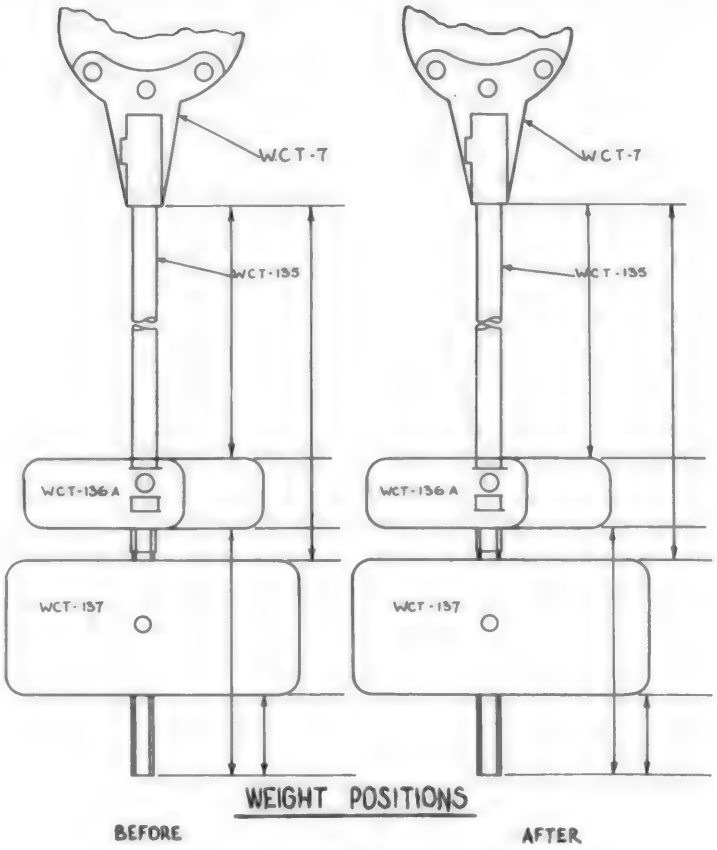

Fig. 5

Factory experience

During the 1955 and 1956 pea seasons frequent simultaneous checks were made between the factory tenderometers and the Master tenderometer, with raw peas transported to the production centres in ice water in Dewar flasks, the factory tenderometers having been previously standardised with frozen peas. In addition, occasional checks were also made with standard frozen peas. These tests generally showed that when a tenderometer was in agreement with the Master on frozen peas, agreement was also obtained with the Dewar flask peas, but a few anomalies did occur and could not be explained. Our conclusion was, however, that the Dewar flask peas offered a sufficiently reliable medium for frequent check tests in the field.

The most common cause for incorrect tenderometer readings was due to incorrect setting of the pointer actuating angle or to a faulty angle. Cracked angles were also found; these caused considerable variation in readings.

In order to prevent excessive wear and damage to the grids it is essential to thoroughly wash pea samples in cold mains water before testing. The temperature of the wash water does not cause significant changes in tenderometer readings. Also, the 1952 Annual Report of the National Canners Association refers to results of washing tests which show that wetting the peas has no significant effect on the tenderometer reading.

It is not easy to see when a worn grid needs replacing, but if wear is excessive the tenderometer will generally read low and can often

UNILEVER LIMITED, FOOD RESEARCH DEPT., COLWORTH HOUSE

REPORT ON TENDEROMETER STANDARDISATION

Factory:

Make of machine: Reference:

Date received:

REPORT ON MACHINE AS RECEIVED

General condition:

State of grid:

State of bearings:

Broken/damaged parts:

Comments:

	Date	Batch peas used	Machine No.	Readings	Average (mean)
1st test					
Action taken:					
2nd test					
Action taken:					
3rd test					
Action taken:					
Final test					
Action taken:					

Moment of machine:
(a) As received: (b) Standardised:

RECOMMENDATIONS:

Certified: Date despatched:

Fig. 6.

be brought into agreement with the Master by moving the counterweights up the shaft. When the weights have been moved up as far as possible a new grid assembly should be obtained. However, in an emergency and if the grids appear to be otherwise in good condition it may be possible to fit lighter weights and re-standardise the machine. When a hard object has been allowed to enter the grid space causing one or more of the grid leaves to become permanently displaced, loosened or burred, the tenderometer will almost certainly go well out of adjustment. In such cases the grid assembly must be either replaced or completely overhauled and the tenderometer re-standardised.

Acknowledgment

The authors wish to thank the Directors of Unilever, Ltd., for permission to publish this paper.

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[2] Report of the Tenderometer Subcommittee of the National Canners' Association Committee on Scientific Research, 1952 (see Memorandum 2357 of the Fruit and Vegetable Canning and Quick Freezing Research Association).
[3] C. J. Tressler, *The Canner*, 1949, **108** (25), 31.
[4] Anon., *The Canning Trade*, 1951, **73** (34), 10.

▶ A number of additional items have been included in W. J. Bush and Co.'s latest price list of essences for the food and confectionery industries. The recent rises in the cost of basic solvents and other raw materials is reflected in the prices quoted. To partly offset these, in future all 1 lb. bottles are free and non-returnable and for the gallon bottle (9/10 lb.) there is a reduction of 6d. a lb. on the 1 lb. price.

▶ An article on the manufacture of Wall's *Fruties*—"the 15-minute drink"—is a feature of the Spring issue of *Wall's Magazine*, house journal of T. Wall and Sons, Ltd. Automatic filling machines measure out an exact quantity of the final mix into a series of moulds. A lid containing the sticks is inserted into the moulds which are then placed in a brine tank, kept at a temperature of −10°C. Once they have been frozen, the mould is passed through a demoulding tank, thus enabling the lid to be removed. The *Fruties* are then placed directly on to a bagging machine.

The CO_2 Method of Stunning Pigs for Slaughter

By S. M. Blomquist*

Carbon dioxide is an effective and quick acting stunning gas which is well suited for pig slaughtering. It is expected that the use of CO_2 for this purpose will soon be legalised in this country (see FOOD MANUFACTURE, April, p. 180). The following article, from the Danish Meat Research Institute, gives a timely appraisal of CO_2 stunning.

THE NARCOTIC effect of carbon dioxide (CO_2) was demonstrated by Henry Hall Hickman (Poulsen)[1] as early as 1827. At the beginning of this century several research workers experimented with CO_2 as an anæsthetic for humans without obtaining any practical useful results. The greatest drawback is that CO_2 provokes a violent increase in blood pressure which makes this form of narcosis unsuitable surgically.

In 1926 Loevenhart, Lorenz and Waters (Meduna)[2] tried to cure psychic ailments in humans with CO_2 inhalations. This method of treatment has been highly developed in recent times and is used with success in the case of many psychic disturbances.

Bendersky,[3] in 1904, was the first to try to use CO_2 for slaughter animals. However, he did not succeed in obtaining satisfactory results. The research was taken up again with pigs, and this time with success, in 1950 by the meat packers Geo. A. Hormel and Co. in Austin, Minnesota, U.S.A. Hormel's installations have been described by Swem.[4]

Technically and economically it is difficult to apply the American apparatus to Danish conditions. Kragh and Wernberg have constructed an apparatus which has proved to be suited to larger Danish slaughter-houses.[5]

Principal effect of CO_2

The use of CO_2 in human therapy has intensified the study of the effect of CO_2 on the nervous system. Although the investigations have only partly answered the many questions which arise, a few observations have been made which can explain some of them. It is known[2] that an isolated nerve in a high CO_2 tension milieu demands greater irritation to react, that is, to send out impulses. In addition, it is known that the speed of the impulse along the nerve is reduced. CO_2 also has the effect of making the transfer of impulses from one nerve cell to another more difficult because the connections between the nerve cells (synapses) are partly blocked by the high CO_2 concentration. These conditions make CO_2 an effective anæsthetic.

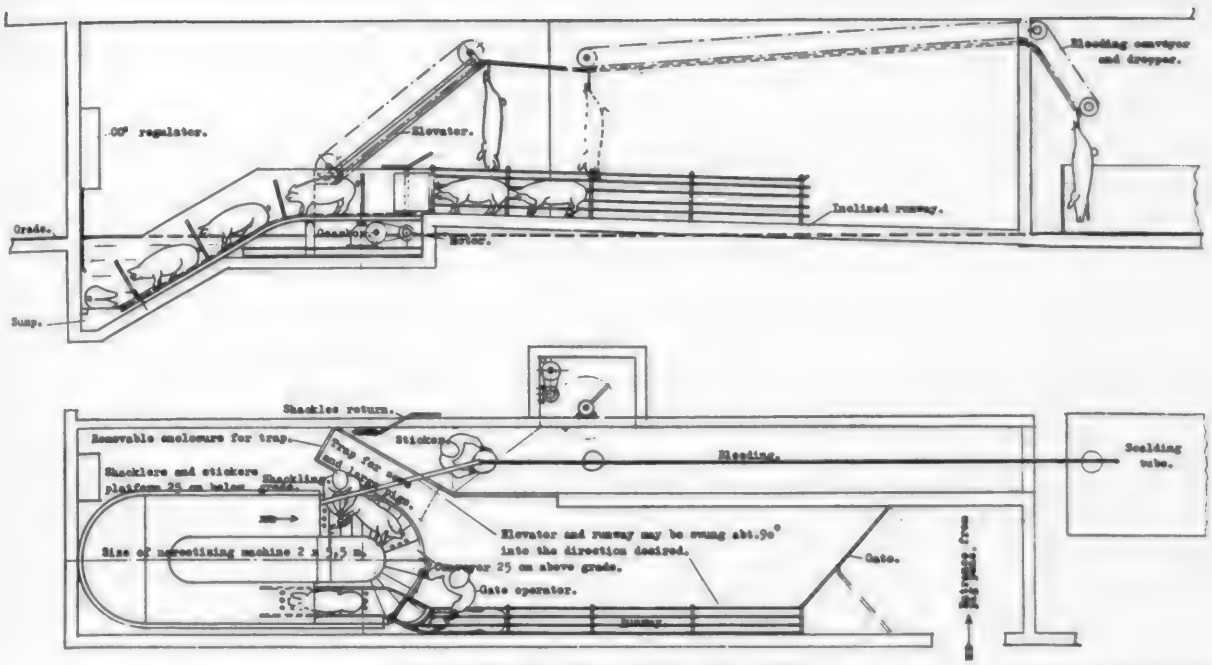
CO_2 stunning plant in the Danish bacon factory at Kolding.

Experience previously acquired regarding the physiological effect of carbon dioxide cannot be applied directly to pig stunning because the experiments were almost all made with 30-35% CO_2 and 70-65% O_2. In stunning animals for slaughter, about 65% CO_2 mixed with atmospheric air is used.

Development of CO_2 stunning for pigs

The reaction of pigs to CO_2 stunning was investigated during an experiment carried out by the

* Danish Meat Research Institute.



How the Danish CO_2 stunning plant works. *Courtesy: N. E. Wernberg.*

Danish Meat Research Institute (Slagteriernes Forskningsinstitut)[6] when 70% CO_2 in ordinary air was used. The pigs moved around rather freely during the experiment, and a person with a supply of fresh air followed the animals during the experiment. During the first 15 sec. the animals were apparently unaffected by the stunning gas. They went around calmly sniffing manure from other pigs, and showed no sign of cramps in the pharynx, larynx, or bronchi. Nor did they seem to have smarting in the mucous membranes.

Fifteen seconds after the pigs were let into the stunning chamber, there appeared a state of excitement where they bent their heads backwards and fell over on their sides. It was impossible at that point to make any investigations of the corneal reflex (blink reflex when the cornea is touched), but 5 sec. after the beginning of the reaction the sense of pain seemed to have been lost or, at any rate greatly reduced, since the pigs did not react when their hooves were stepped on with wooden shoes. At this point all eye movements had ceased; the pigs did not follow a hand drawn before their heads. The skin was still sensitive to a slight touch. Fifteen seconds after the beginning of the fit the corneal reflex disappeared. The time periods mentioned were approximately the same for five experimental animals.

From the knowledge of the course of narcosis in general[7] it can be concluded that the pigs suddenly lose consciousness about 15 sec. after they are put into the CO_2 atmosphere. A few seconds later there is no longer any sense of pain and after a few seconds more the animal is generally anæsthetised, that is, feeling of pain, consciousness, and voluntary and involuntary muscular movements disappear, without essentially affecting circulation or any other vital functions.

The fact that the pigs are apparently unaffected during the first seconds that they are in the CO_2 atmosphere is noteworthy. Leake and Waters[8] in 1928 reported that a mixture of 30% CO_2 and 70% O_2 tastes very sour to humans and gives them the uncomfortable feeling of not being able to breathe. Seevers[9] reports that even 20% CO_2 gives cramps in the pharynx and a desire to cough.

It would be interesting to let a human volunteer under CO_2-stunning under conditions similar to those used for pigs. Since, however, the increase in blood pressure is considerable, there is a

Table 1.

Stunning	Number of germs/cm³ Meat side	Number of germs/cm³ Skin side	Mean rating of sides after transport
CO_2	$7{\cdot}16\times10^5$	$6{\cdot}48\times10^5$	6·83
None	$9{\cdot}26\times10^5$	$9{\cdot}74\times10^5$	6·28
Electric	$6{\cdot}02\times10^5$	$5{\cdot}52\times10^5$	5·43

Table 2. T-test on Number of Germs and Ratings.

	CO_2—electric	CO_2—not stunned	Electric—not stunned
Meat side	0·167	0·263	0·460
Skin side	2·52*	0·945	2·33*
Ratings	4·06***	1·62	2·42*

* Significance level 5% *** Significance level 0·1%

slight possibility of the experiment being fatal, and it has not been carried out at the Danish Meat Research Institute.

A Dutch volunteer went through such an experiment. He reacted as if exposure to the carbon dioxide air mixture did not cause any specific discomfort and recovered normally with no recollection of pain (Wernberg).[14]

Zillgitt[15] went through a similar experience in 1938. While rearranging pieces of dry ice in a deep metal box he was subjected to the CO_2 atmosphere and fainted. He fell on the floor and recovered almost instantaneously, feeling only slightly fatigued. In a few minutes he was working again. He had no recollection of any disagreeable odour or taste or other effect of the gas.

One would assume that pigs have somewhat the same reactions as humans; the reason why they do not react to 70% CO_2 is presumably that the high CO_2 concentration paralyses the sense cells.

Recovery after CO_2 stunning

After the pigs are again brought out into atmospheric air, about 80 sec. elapse before the corneal reflex appears again. Judging by generally accepted criteria it seems reasonable to assume that the pigs are unconscious during this period. The animals wake up calmly in about 1½-2 min. if they are allowed to lie; 10-15 min. later they have completely recovered.

In the Danish stunning procedure, the pigs are stuck about 30 sec. after they are brought up from the pit.

After proper stunning, that is with 65-70% CO_2, when the pigs are taken out of the stunning apparatus, they lie calmly and completely relaxed. Respiration is reduced to 5-7 per min., and each inspiration is accompanied by a gasping sound and a movement of the jaw. The pigs do not react to shackling, and sticking and bleeding occurs with a strong blood spurt from the sticking wound.

In some pigs there is a partial reddening of the skin, which, however, disappears during bleeding.

During and after bleeding only a few, but often strong, reflex movements can be seen in the front legs and in the back.

The pigs can be scalded and dehaired easily, and the relaxed and slightly elastic condition of the muscles makes splitting easier. Bleeding of the carcass and the organs is satisfactory, and it is especially noteworthy that lung bleeding almost never occurs.

Muscular bleeding

A Danish Committee on Slaughtering Methods[10] discussed two forms of muscular bleeding in electrically stunned pigs, diffuse bleeding and multiple bleedings, so-called blood splashes. Muscular bleeding has also been described by Blomquist.[11]

Diffuse bleeding occurs in the inner side of the ham about equally in unstunned and electrically stunned pigs. In CO_2 stunned pigs it is also seen, although to a lesser extent. The reason for diffuse bleeding is that the weight of

Table 3. Means of pH.

Muscle	Stunning	Spear glass electrode	Significance of difference	Measuring immediately after mincing of meat	Significance of difference	Measuring 6 hr. after mincing of meat	Significance of difference
Inner side of ham ...	Electr.	5·61	—	5·46	—	5·46	—
	CO_2	5·59		5·44		5·42	
Tenderloin	Electr.	5·73	—	5·62	—	5·62	—
	CO_2	5·67		5·54		5·53	

Table 4. Variance (s^2).

Muscle	Stunning	Spear glass electrode	Significance level	Measuring immediately after mincing of meat	Significance level	Measuring 6 hr. after mincing of meat	Significance level
Inner side of ham ...	Electr.	0·0281	0·05%	0·0233	0·05%	0·0224	0·05%
	CO_2	0·0067		0·0043		0·0057	
Tenderloin	Electr.	0·0442	0·10%	0·0732	0·05%	0·0722	0·05%
	CO_2	0·0138		0·0119		0·0130	

Table 5. Standard deviation.

Muscle	Stunning	Spear glass electrode	Ratio	Measuring immediately after mincing of meat	Ratio	Measuring 6 hrs. after mincing of meat	Ratio
Inner side of ham ...	Electr.	0·168	2·1	0·153	2·3	0·150	2·0
	CO_2	0·0819	1	0·0653	1	0·0753	1
Tenderloin	Electr.	0·210	1·8	0·271	2·5	0·269	2·4
	CO_2	0·117	1	0·109	1	0·114	1

the carcass is enough sometimes to tear the arteries of the hip joint in some pigs during shackling and sticking. When this does not appear so frequently after CO_2 stunning, it is presumably due to the fact that CO_2 stunned pigs are always relaxed during shackling.

Blood splashes, which can be called typical electrical stunning bleeding, is not seen after CO_2 stunning; the reason for this is not certain, but is assumed to be that the increase in blood pressure during CO_2 stunning is less than during electrical stunning. Bleeding in the tenderloins occurs less frequently than after electrical stunning, also presumably because the CO_2 stunned pigs are always calm during shackling. The Committee on Slaughtering Methods[10] described a special procedure for electrical stunning in which sticking takes place not later than 5 sec. after the current is switched off. When that method is used, blood splashes are rare.

Keeping quality

The keeping quality of CO_2 stunned carcasses compared with electrically stunned and unstunned carcasses was investigated by the Danish Meat Research Institute.[12] After storage of the carcasses at 8-10°C. for 3 days no definite difference was found in the bacterial count on the meat side in the 3 groups. The bacterial count on the skin side was significantly higher on the electrically stunned carcasses, while there was no difference between the CO_2 stunned and the unstunned carcasses. After rail transport for 120 miles (in August) the surface condition of the carcasses was judged. The CO_2 stunned carcasses had kept best and the electrically stunned poorest. There were significant differences in the judges' ratings. The results of the experiment are given in Tables 1 and 2. The *p*H of the carcass was investigated one day after slaughtering by the Danish Meat Research Institute.[13] A comparison was made between the CO_2 stunned and the electrically stunned pigs. No definite difference was found in the mean values on measuring the inner side of the hams and the tenderloins. On the other hand, the standard deviations for *p*H in the electrically stunned pigs was twice as large as in the CO_2 stunned ones. Computations based on the square of the standard deviation (variance) showed very high statistical probability of the difference. Almost identical results were obtained when measuring the *p*H on an incubated macerate and by measuring directly with a spear glass electrode. The figures are shown in Tables 3, 4, and 5.

Since the stunning apparatus was developed in its present form only a few difficulties have arisen. Most have been related to the fact that the automatic regulation of the supply of CO_2 does not always function satisfactorily. Any defect in the automatic system should therefore be remedied immediately. If the concentration of CO_2 is too low, the pigs are poorly stunned. If it is too high, the pigs become stiff, have violent reflex movements and bleed poorly. Large amounts of blood accumulate in the skin, which becomes evident when the pigs are scalded and the skin appears bluish. These blood accumulations are not inclined to disappear during bleeding. The physiological effects of very high CO_2 concentrations (over 75%) has not been closely investigated, but considerable observations seem to show that very high CO_2 concentrations result in higher *p*H of the carcass, possibly as a result of poor bleeding.

Conclusions

Carbon dioxide is an effective and quick-acting stunning gas which is well suited to stunning of pigs for a very short time. The unconscious pigs are relaxed, and do not react to shackling and sticking. Bleeding of the carcass and organs is satisfactory. The keeping quality of CO_2 stunned carcasses seems to be better than the keeping quality of electrically stunned carcasses.

The CO_2 concentration in the stunning apparatus must be held as constant as possible between 65 and 70%. Too high a percentage of CO_2 causes rather violent cramps to appear in single pigs, the carcasses are stiff after sticking and at times bleed poorly.

SUMMARY

CO_2 is a stunning medium which works by reducing the irritability of the nerve cells as well as the synapses.

During investigations of pigs under the effect of 70% CO_2 in atmospheric air, it was found that this air mixture apparently did not irritate the pigs. After 15 sec. a state of excitement began and apparently the animal simultaneously lost consciousness. The first sign of consciousness appeared about 2 min. after the animal had been returned to normal atmosphere. Bleeding and other conditions of the carcass after sticking were satisfactory.

The keeping quality of the meat of the carcass and the *p*H were normal. It should be especially noted that the high standard deviation in *p*H known from electrically stunned carcasses is not found after CO_2 stunning.

If the CO_2 concentration is too high (over 75%) during stunning, poor bleeding, stiff muscles, and bone fractures can be seen.

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Seven-Up Steps Up Bottling Operations

A NEW £175,000 bottling plant for soft drinks has been opened at Chiswick as the HQ. of the Seven-Up Bottling Co. (London), Ltd., a subsidiary of Fuller, Smith and Turner, the brewers.

The opening ceremony was carried out by Mr. Howard Ridgway, President of the Seven-Up Export Corporation, New York, who came over to this country specially for the occasion.

The new building is of a steel frame construction with panel fitting and 11 in. cavity brick walls. There was a little trouble with the foundation sub-soil, which was found to contain a strata of broken bottles and assorted broken china; the builders had to get beneath this strata by digging. On the river front a pile foundation was laid.

The floors are of reinforced concrete. Lighting on the bottling floor is the latest B.T.H. Invertrunking type of fluorescent lighting.

Central heating is by oil fired steam boilers using the waste steam from the processing plant.

Cases of empty bottles are loaded on to a belt conveyor on the ground floor of the factory and arrive on the first floor at the infeed end of the 24 wide *Superkleen* liquid washer. Clean bottles arrive at the discharge end of the washer at the rate of 240 per min., and then pass in front of an illuminated inspection screen before going on to the 60 head *Liquid* combination filler and crowner. There they receive a measured quantity of syrup and are then filled with carbonated water.

This water has gone through a treatment process which involves the adjustment of its alkalinity, thorough sterilisation and the removal of all chlorine and suspended particles by filtration. Finally, it is cooled to just above freezing point, and carbonated to the required degree.

When the bottles have been crowned they pass a further inspection screen and then travel to the *Liquid* spinner mixer which inverts each bottle and spins it to ensure thorough mixing of its contents. Afterwards each bottle is fed into a Lilleshall-Webster automatic case packer which drops 24 bottles at a time into each half-depth case. The full case is then returned to the case storage on the ground floor, where it is loaded on to pallets in units of 50 to each pallet. The present output is 1,200 doz. bottles per hr., but space has been allowed to accommodate a second bottling line to double this output. In addition to bottling *Seven-Up* the plant is also producing *Sparkling Sun Fresh*.

When the firm started production in 1952 they had two trucks. Now 36 are on the road full time.

Above: **The Seven-Up Co.'s new premises at Chiswick. The tall building contains the case storage on the ground floor and the bottling hall above that.** *Right:* **The "Liquid" 60-head combination low-pressure beverage filter with a 30-head syruper and a 10-head crowner, all mounted on one base, are capable of filling 1,200 doz. bottles per hr. The operator is watching the filled bottles passing before an inspection screen.**

Advances in Food Technology

VITAMIN B_{12}

Nutritional Role

Two more papers on the role of vitamin B_{12} in nucleic acid metabolism have been published by the American Meat Institute Foundation. In this work it was clearly shown that vitamin B_{12} is necessary for the synthesis of the sugar component of the deoxyribonucleic acid, the vital chemical constituent of cell nuclei associated with cell division. In demonstrating this function for vitamin B_{12}, nucleic acid derivatives isotopically labelled with C^{14} were prepared and their subsequent metabolism studied with vitamin B_{12} deficient and supplemented organisms.

These studies provide information on why the body needs vitamin B_{12}. This is of importance since meats are among the richest dietary sources of vitamin B_{12}.—Downing and Schweigert, *J. Biol. Chem*, 1956, **220**, 513 and 521.

PORK

Determination of Lean Meat Ratio

In view of the fact that, in some countries, the value of a slaughtered pig is determined from the bacon quality and, in other countries, from the ratio of the lean meat, contained in the carcass, the Livestock Breeding Research Institute at Goettingen University has carried out research on the criteria which might serve to determine the lean meat ratio of the carcasses of pigs. Carcasses of 246 pigs, fattened by individual feeding and graded, were dissected into lean meat, fat, bones and rind. Before the dissection a tissue sample was taken by means of a drill from a point between the fifth and sixth rib, and was also dissected into its fat and lean meat portions. The lean meat ratio of the samples was found to be similar to that of the whole carcass for all pigs not exceeding a certain weight. Another criterion is the area of the eye muscle of loin. But an even better criterion for the determination of the lean meat ratio appears to be the product of the above-mentioned area and the slaughter length.—F. Haring, R. Gruhn, and E. Wode, *Die Fleischwirtschaft*, 1957, **9**, 64.

FISH

Antibiotic Preservative

Experiments to determine whether the use of chlortetracycline (aureomycin) to suppress the development of normally occurring bacteria causing fish spoilage might also favour the growth of specific food-poisoning bacteria, were made by the Fisheries Research Board of Canada. All evidence suggested that CTC treatment would inhibit rather than promote the growth of these bacteria.

The three most widely recognised types of food poisoning caused by bacteria are (1) botulism, (2) *Staphylococcus* poisoning, and (3) paratyphoid infections ("Salmonellosis"). Since fish are usually stored in ice or at low temperatures, the first two types of poisoning do not develop well. The third type is brought about by an actual intestinal infection through introduction of the disease-producing bacteria into the host. The object of the present work was to establish the effect of CTC treatment of fish on the development of bacteria capable of causing botulism or *Staphylococcus* poisoning.

In the first experiment it was found that 2 p.p.m. of CTC strongly retarded the slow multiplication of *Staphylococcus* organisms which occurred in lingcod flesh at 50°F. A second experiment showed that in fish treated with 2 p.p.m. of CTC there was a decrease of about 40% in the *Clostridium botulinus* population, while in the untreated flesh there was no significant change.—H. M. Bluhm and H. L. A. Tarr, *Prog. Repts. Pacific Coast Stations*, 1956, No. 106.

Electronic Control of Materials Handling

(*Concluded from page 223*)

is a control room where one man controls carton pickup, pallet loading and movement of pallets over 1½ miles of conveyors. Many electronic devices are incorporated in this centralised control system. All 12 accumulator conveyors and 5 trunk conveyors are located near ceiling height in order to conserve floor space. The switching control centre for the accumulator conveyors is located near their junctions with trunk conveyors on the fourth floor of the dispatch building. Panel controls here include electrical plug-in cable connections for each trunk conveyor with selected accumulator conveyors. Indicator lamps show operating conditions, and an intercommunication system allows speech with foremen in the plant.

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Machinery and Equipment

ALUMINIUM FOOD TRAYS

Stackable aluminium trays for food handling are now being made by Lawton (Successors), Ltd. This company has been making a range of trays and pans in steel for many years under the name *Sentinel* but the aluminium trays are specially suitable for the food industry. They are available in two sizes, internal dimensions being 20 in. long × 10 in. wide × 5 in. deep or 16 in. × 8½ in. × 4½ in. Trays can be supplied with the user's name embossed in the base, or with a side card holder which can be used for recording. Provision can also be made for holes to be included in the base for drainage purposes.

MEAT MINCERS

New *Wexonia* self-feeding meat mincers have been introduced to the British market by Iwel, Ltd.

Type RKC-RKF has an outer cover and bowl made of stainless steel and a stainless material is used throughout the construction. The worm housing is provided with a handle and the single turn locking method enables it to be readily detached from the bearing for cleaning. The motor is built into the frame and the latest design of **V**-belt drive ensures silent operation. By making the positioning of the motor adjustable, the belts can be tensioned if required. All journals are fitted with SKF bearings, and these models include a double system of cutters comprising two cutter blades and three plates of processed and tempered steel. Production is from 1,320 to 3,300 lb. per hr.

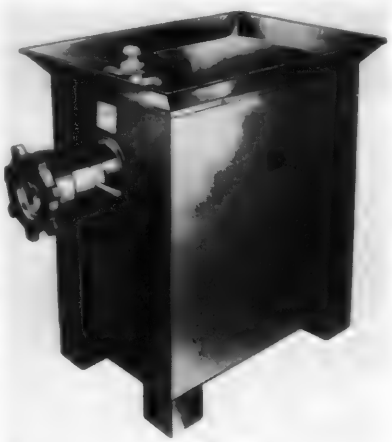
The *Wexonia* mincer GWS 200 has a capacity of 11,000 lb. per hr. and incorporates an overall stainless coating with automatic feed. The drive includes a 30 h.p. motor coupled to a gear box, having helically cut gears running in oil for silent operation. These gears are made of material resistant to wear and SKF ball or roller bearings have been fitted to all shafts.

The worm screw, worm housing and cutter recess with holding nut, are made of cast iron forming a unit of durable construction which can be quickly assembled due to the simple type of bayonet fitting of the locking arrangement.

The cutter housing has a double set of cutters, 2 cutters and 3 plates, of high quality steel.

The *Wexonia* meat mincer type SFS 150 has a capacity of 5,500-6,600 lb. per hr. A large hopper has been incorporated which is fitted with raised edges on three of its sides. An easily removable down-feed screw facilitates feeding to the worm. The mincer cylinder is provided with a handle and bayonet fixing and may be loosened for cleaning by a simple hand action. The knife system is double and consists of two knives and 3 hole plates of special steel. All bearings are fitted with SKF ball bearings and are easy to grease.

The 20 h.p. motor is built into the frame and power is transmitted through **V**-belts from the motor to a gear box with helical gears running in oil. A single device is incorporated for moving the motor so that the **V**-belts can readily be tensioned when required.



"Wexonia" type RKC-RKF meat mincer.

PUNCH SERVER

A punch server to further the sale of hot alcoholic and non-alcoholic beverages by forming an attractive and compact counter unit is being produced by the Cona Coffee Machine Co. The server consists of a tripod holder with chromium-plated legs and a seating ring carrying a three pint capacity glass server with a handle and a stainless steel pouring lid. It is heated by a methylated spirit lamp.

Each unit costs £5 5s. net. Models are available in which two or three punch servers have been joined at £12 12s. and £17 17s. respectively.

"WALK-IN" FREEZER

A new lightweight portable cold-room, which, its designers claim, can be erected anywhere, has been developed by Penfold and Partners. Constructed of 7 ft. × 7 ft. aluminium 100% insulated sections, each weighing only 85 lb., the *Walk-in-Freezer* is assembled by simple screwing.

Fitted outside is a hermetically sealed fractional horsepower compressor unit, using less than 1 unit of electricity per hour, pre-set to maintain the required low temperature to suit whatever product is stored.

It is claimed that frost heave has been eliminated. By virtue of its portability, the freezer does not become a fixture and, as such, landlord's property. Knocked down into a crate, it occupies only 98 cu. ft. of shipping space, thereby minimising handling and freight charges for both export and internal transit.

Portable freezer assembled by simple screwing.

FLOOR CLEANING MACHINES

A new range of battery-powered floor cleaning equipment has been introduced by Diamond Motors (Wolverhampton), Ltd. Known as the *Mechocleen* range, it comprises three machines, a dry scrubber/polisher, a wet/dry scrubber/polisher and a dryer. All three machines are powered by *Exide* traction batteries.

The two scrubbing machines can be adapted to clean any type of floor simply by changing brushes, which can be done in 1 min. Brushes range from those with 90-ton tensile oil-tempered steel bristles for scouring impacted grease deposits to polishing types with bristles of Tampico white Mexican fibre or nylon.

Controls on the handlebar are restricted to the minimum. On the dry scrubber version there is only a simple reversing switch, which can be used to rotate the brushes in either direction so that the brushes are given a self-sharpening action.

The wet scrubber version has a 4½ gal. capacity tank mounted on the handlebar upright and a variable feed control. This enables the operator to vary the flow of fluid from a mere trickle to a steady flow. The fluid is fed through a special water feed device which sprinkles it in front of the oncoming brushes. The area of fluid deposit is carefully controlled to ensure that it is all "ensnared" by the sweep of the brushes.

An aluminium dust cover is used on the gears between the electric motor and the brushes, and polyester fibreglass mouldings cover the motor unit and the switch mechanism.

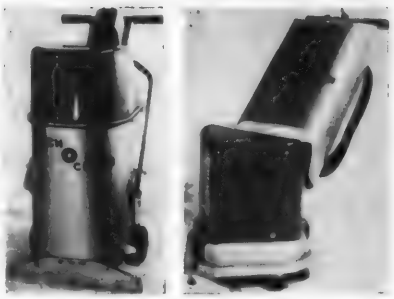
The *Mechocleen* dry scrubber/polisher costs (complete with battery and one set of brushes) £145 15s. and the dry/wet scrubber/polisher costs (complete with battery and one set of brushes £152 5s. The dryer costs £107 15s.

ROTARY BOTTLE LABELLER

A high speed automatic rotary bottle labelling machine is now available in this country from Chelle, Ltd. The design of the machine known as the type RO-51, is claimed to be entirely new

Bottles or jars are passed through the labeller in an upright position on a standard slat conveyor which may be linked up to other conveyors of the plant. During their passage through the machine, the bottles or jars pass the label cylinder where a label is rolled on to each one.

Containers entering the labelling machine on the conveyor, first pass through a safety bend before entering the feed worm for spacing. Any container which topples over, or even bursts, is caught in the bend and prevented from entering the worm. At the same time, the machine is automatically stopped by an emergency switch.



"Mechocleen" floor dryer and (*right*) floor scrubber.

As each bottle or jar passes through the feed worm, it operates a feeler on the other side of the conveyor, arranged to connect the vacuum (for picking up a label) to the appropriate segment of the revolving label cylinder. The label is held on to the label cylinder by the vacuum until it is applied to a container. This vacuum arrangement makes it possible to dispense with the former troublesome label pickers. Only a novel forked stripper is provided to ensure that the label will not adhere to the gumming roller when the adhesive is applied.

When the passage of a container past the feeler causes the vacuum to be connected to the appropriate segment of the label cylinder, a label is drawn sideways from the label box which has been swivelled slightly towards the label cylinder for this purpose. As the label is carried towards the gumming station by rotation of the label cylinder, it passes a label feeler which initiates the gumming process. At the right moment, the gum box swivels slightly towards the label and applies the horizontal gum strips.

The gum delivery from the upright, gunmetal gum box can be adjusted by means of a scraper so that the horizontal gum strips can be made exceedingly thin. The gum in the container is constantly agitated. No drip device is required.

The gumming level may be adjusted by the two hand wheels above the cover.

The label which has been picked up by the label cylinder and subsequently gummed, is then brought round to meet the container which, as it passed the feeler opposite the feed worm, caused that label to be detached from the label stack. The rotation of the label cylinder against the container causes it to rotate and thus rolls the label into position.

The machine operates on the principle of "No container—no label." As the action of picking a label from the label stack is initiated by a bottle or jar pressing against the feeler whilst passing through the feed worm, the absence of a container at this point will result in no label being picked up. Subsequently, the gumming process which is initiated by the label feeler will, in the absence of a label, not be brought into operation.

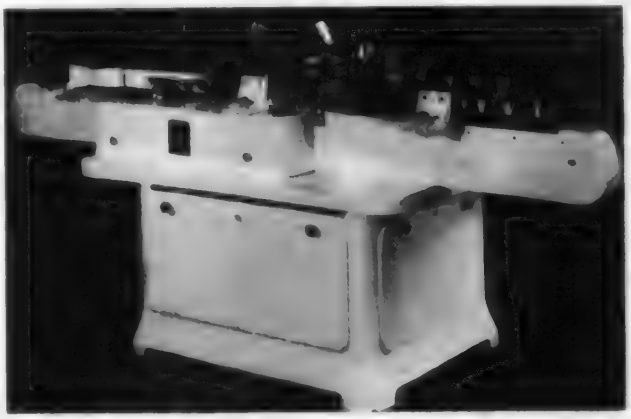
Immediately after the label has been rolled on, the container proceeds with a continued rotary motion against a foam rubber wall which serves as a "pressing-on" station in place of the former complicated "pressers-on," and a neat and accurate positioning is achieved. The labelled containers are delivered on to a rotating circular table 2 ft. 3½ in. in diameter. This table may be arranged on either side of the conveyor.

WALL CHART

A "Time Load" wall chart has been added to their *Movigraph* range by Adapta-Charts, Ltd. It is said to have the advantage of rapid and easy indication of all kinds of states, activities and processes.

The basis of the system is a small interlocking plastic signal, which interlocks with other signals to form a continuous line representing a certain phase or state. The signals fit into channels on a perforated *Movigraph* panel. The signals can be written on with a special pencil.

The price of the *Movigraph* time load varies according to the size and type of application. A small installation would cost about £20.



Automatic rotary bottle labeller.

Packaging

Rustless strapping

To combat the danger of rust to containers, especially those sent abroad, a tensional steel strapping, coated with a glossy jet black, rust-resisting finish, *Agripta Wethagard*, has been developed by the Packers Supply Co. Ltd. This can also be supplied printed in colour. It is delivered in millwound coils and a combined trolley and coil holder is available to facilitate movement from job to job.

Frozen food cartons

Many million frozen food cartons for Birds Eye are automatically erected, filled, closed and coded by the *Kliklok* system of packaging, using FMC fillers, installed by E. S. and A. Robinson, Ltd. This system is claimed to be the fastest and most flexible carton assembly and filling line in the U.K., with an output rate that can be regulated by adjusting a single knob.

The cartons are formed from pure, bleached glass-waxed board of 0·015 in. thickness. The *Kliklok* unit has two sets of heads and plungers which erect and lock the cartons simultaneously at a rate of up to 225 cartons per min. The plain, erected cartons are then automatically filled, closed and wrapped with a waxed paper which is photogravure printed in colour with a photographic representation of the cartons' contents. The wrappers are heat-sealed, the entire process being fully integrated and synchronised for maximum speed.

At normal speeds it is claimed that the unit can replace three or more girls erecting cartons by hand. It can also be adapted for a wide range of sizes and shapes of cartons by using interchangeable sets of forming heads and plungers which can be replaced within a few minutes.

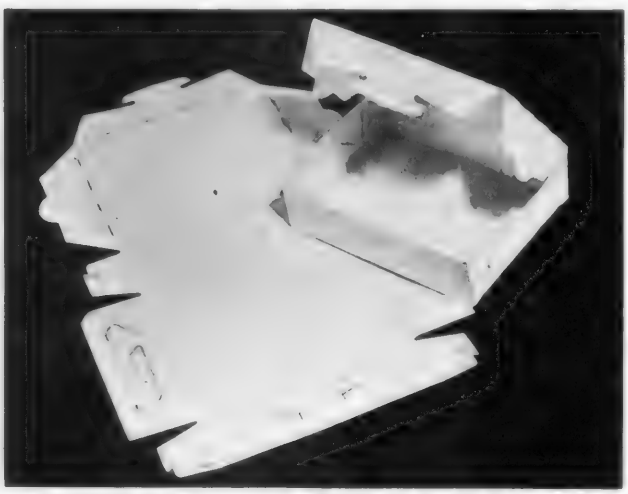
Three types of machines are available. The high speed double head frozen food machine used for Birds Eye frozen food cartons consists of a complete automatic packing line. The standard automatic machine can be linked in with existing filling and conveyor belting arrangements, or can be supplied with conveyor belting, closure unit and other mechanical aids to packaging. A hand-operated machine, suggested for smaller users, can be arranged to deliver cartons to the customers' existing packing lines.

Rigid plastic container

What is thought to be the first rigid plastic food container has now been launched generally and is in use for jams, marmalades and honey.

It is known as the *Liner-Lip* container and is essentially a moulded polystyrene pack having a recessed lip on the top circumference in which is inserted a rubber latex compound. After the product has been filled into the pack an aluminium foil lid can be applied automatically by a capping machine which forces the foil over the sealing compound into a recessed lip producing a hermetically sealed pack, the foil lid is then sealed around the outer edge of the lip.

In course of development for high output is a rotary sealer, adapted from the dairy rotary sealer, which includes a cap-making press capable of punching and embossing from aluminium foil strip of ·040 mm. to ·085 mm. thickness.



Kliklok carton flat, and a partly assembled carton, used for packing Bird's Eye frozen foods.

Coil of rustless strapping fitted to special trolley.

It can also be adapted for use with Synchro-print foil if required, so that each cap is automatically cut from printed strip, the print being in register every time.

The research department of Fisher's Foils, Ltd., have co-operated with the manufacturers of the rotary sealer in perfecting the aluminium foil capping strip so that strip printed with individual designs can be used in conjunction with the *Liner-Lip* container which is available in a variety of colours.

New aluminium seal

A new aluminium closure, has been introduced by Metal Closures, Ltd., to provide a hermetic easy-to-remove seal on packs such as pickles, jams, preserves, etc. It is similar in appearance to their R.O. seal. It has a separate inner panel of aluminium, multi-coated with special lacquers to withstand corrosion. To make it leak-proof it has a gasket of plastic material (polyvinyl chloride) set into a circular channel of the inner aluminium shell. This plastic ring is " sandwiched " between the seal and the glass container when head pressure is applied by the R.O. sealing machine. By preventing the ingress of air and the seepage of the contents, the pack is guaranteed to reach the consumer in the original " factory-fresh " condition.

The first product to carry the new closures was the Crosse and Blackwell Branston pickle. A larger size has been adopted as a standard closure for the *Oxford* marmalade and preserves marketed in this country and in America by Frank Cooper, Ltd.

The Sandwich Spread packs of the H. J. Heinz Co. have also been changed over to the new seal, thus extending the range of R.O. seals so long used by this company for packing salad cream, tomato ketchup, malt vinegar, etc.

News Digest

CO_2 stunning at Birmingham bacon factory

M. Bywater and Co., Ltd., are extending their pig slaughtering, bacon, sausage, pie and cooked meat factory at Small Heath, Birmingham, 10, by the construction of a reinforced concrete frame building, approximately 130 ft. x 100 ft., to house an up-to-date slaughter-house and carcase-dressing department, with modern low temperature cold rooms, capable of dealing with up to 2,000 pigs per week.

This factory will be one of the first in the country to instal a low temperature pre-chiller through which pig carcases are conveyed direct from slaughter line at the rate of 100 pigs per hr.; this pre-chiller is capable of chilling 100 pig carcases from 100°F. to 59°F. per hr., when they then enter the after-chiller to be cooled to 40°F. This installation will be carried out by J. and E. Hall, Ltd., of Dartford, Kent, through their Birmingham office.

Provision has also been made for the installation of a CO_2 anaesthetising plant, for it is hoped that legislation will soon be amended to allow use of carbon dioxide for the anaesthetising of pigs. Two important advantages are claimed for this method which depends upon the use of a mixture of carbon dioxide and air. One being the more relaxed condition of the pigs which results in eliminating certain spoilages which occur in bacon and ham, and the second, and by no means an unimportant one, that this method is more humane than electric stunning. Mr. N. E. Wernberg of Copenhagen has advised on the CO_2 plant and the general layout of the slaughterhouse and cold rooms.

The reinforced concrete work comprises a frame with columns at approximately 24 ft. 8 in. x 15 ft. 9 in. centres supporting roof beams and a flat roof which will be covered with asphalte. Included in the reinforced concrete contract are the floor slab, steps, various pits and a basement over part of the site to house refrigeration machinery. The latter has reinforced concrete walls and floor.

The overhead rail system will be suspended from the roof beams which are designed to support point loads of 2,000 lb. and 4,000 lb. respectively and provision is being made by casting in steel sleeves to house the bolts which will secure the supporting steelwork.

The columns, beams and underside of the roof slab to the various cold rooms will carry a specified thermal insulation material, and the columns and brickwork elsewhere will be tiled.

A full description of the CO_2 anaesthetising process appears on p. 230.

Kraft go to Liverpool

Kraft Foods, Ltd., will shortly move from their present factory at Hayes, Middlesex to a large factory now being built at Liverpool. Making this announcement at the company's annual dinner recently, Mr. F. W. Frost, managing director, said that Kraft had outgrown their present site and it had been impossible to get permission to extend and enlarge the factory. The site at Liverpool leaves plenty of room for expansion.

Kraft have offered work in Liverpool to their present employees, but special arrangements are being made in the next few months to find work for those who do not wish to move from Hayes. Employees willing to stand by the company during the changeover will be paid incentive bonuses. Because of the uncertainty regarding the rate of expansion, no steps have been taken either to rent or to sell the Hayes factory, but Mr. Frost said that so far as he could forsee, no definite plans could be made for the continuation of the production at Hayes beyond 1957.

Sugar beet harvest

The British Sugar Corporation announce that this season's sugar beet harvest in Britain exceeded 5 million tons. This was the third highest figure in the history of the industry and 600,000 tons better than the previous years.

Muntona and Fison Ltd.

Edward Fison, Ltd., have changed their name to Muntona and Fison, Ltd. Their address is still Cedars Factory, Stowmarket, Suffolk. (Telephone Stowmarket 400.)

Food Ministry reorganised

The regional reorganisation of the Ministry of Agriculture, Fisheries and Food, in accordance with the principal recommendations of the Wilson Committee came into effect last month.

The new Regional Controllers (see FOOD MANUFACTURE, March, p. 133) have taken up their duties and the former "provinces" of the Ministry are now superseded by "regions." In Wales the functions of the Regional Controller are being carried out by the Welsh Secretary. The administrative county of the North Riding of Yorkshire has become part of the Northern Region.

As suggested in the Wilson Report, the executive and allied work of the 60 county offices in England and Wales has been reorganised into a smaller number of divisional offices each under the charge of a Divisional Executive Officer, responsible to the Regional Controller.

In those county centres which will not become divisional office sites, the Ministry will retain area offices. The county N.A.A.S offices and local field staff will be based on these offices.

More and cheaper citric acid

The first stage of the £250,000 expansion scheme, started last year and designed to increase their output of citric acid by 70%, has just been completed by John and E. Sturge, Ltd. The increased output was planned to meet the growing demand from both home and overseas markets, and progress has been so rapid that the first stage is completed well ahead of schedule and means that extra citric acid has been made available already for the coming summer season.

Completion of the final stage has also been brought forward—January, 1959 to March, 1958—and it is claimed that next year the extra citric acid available to U.K. consumers will reduce considerably the need to pay the higher prices prevailing abroad.

At a recent company meeting, the chairman (Mr. A. L. Wilson) said that during 1956 the total exports of citric acid were 50% greater than during the previous year and that shipments had been made to over 40 countries. In addition to the output of the company's French and Canadian factories, over half the total production of citric acid and other chemicals from the U.K. factories was directly exported.

New standards for ice cream proposed

Proposals for the introduction of three standards of ice cream throughout the country have been discussed with the trade and other organisations by senior Ministry of Food officials. These have been put up "tentatively" and for comment by the Ministry's food standards committee.

The plan, which if adopted would require the amendment of the present standard for ice cream, envisages the use of three terms—"dairy ice cream," "ice cream," and "milk ices."

It is proposed that "dairy ice cream" should possess at least 8% fat (all milk fat) and at least 9% milk solids other than fat.

"Ice cream" would have at least 8% fat, the type of fat not to be specified, and at least 9% milk solids other than fat.

"Milk ices" would have at least 3% fat (all milk fat) and at least 9% milk solids other than fat.

No standard for sugar has been proposed for any of these types but saccharin would be prohibited. A standard minimum weight of total solids per gal. is also proposed.

The present standard for ice cream is—fat at least 5%, milk solids other than fat at least 7·5%, sugar at least 10%. Milk fat is not necessary; most manufacturers use margarine.

Commenting on this report, Mr. J. Markland, a member of the Council of the Association of Public Analysts, said: "The limitation of the term 'ice cream' to the dairy product was considered by the committee but was rejected on the grounds that it 'might prejudice sales of products which are at present quite acceptable.' If this statement is true then it might appear that at least some of the public have been misled for some time"

The "most disturbing" feature of the suggestions is that on "milk ices," according to Mr. Markland. The reason given for this proposal is that there is said to be a demand, especially in Scotland, for ice cream made from liquid milk.

"In response to this alleged demand standards are proposed which certainly would not be attained if liquid milk was the sole source of milk solids," continued Mr. Markland.

"To satisfy the standard for milk solids other than fat it would always be necessary to add milk solids to the ice cream. Similarly, to satisfy the standard for fat it would be necessary either to buy milk of guaranteed fat content or to add butter.

"Whilst I doubt the necessity for providing for 'milk ices' yet if such provision is made the public should know what they are buying. The products sold would in fact be low fat ices, and in my opinion they should be so described and not hidden behind the advertising value of the term 'milk.'"

OBITER DICTA

● Use bubble gum because it gives you flexible jaws.—*B.B.C. announcer.*

● Anything that goes into a sausage skin and is linked is a sausage whether it has got meat in it or not.—*Public Analyst, Mr. Joseph Brown.*

● Mme. Marie Toubert, of Perpignan, today reached the age of 104. She attributes her longevity to having never diluted her wine with water and to having maintained a regular diet of snails.—*The Times.*

● French Fortnight opened in London, not with a fanfare of trumpets, speeches or the waving of red, white and blue flags—but the early arrival at London Airport of a special consignment of bouillabaisse.—*Press release.*

● The Rev. Paul Stevens is on a one-man campaign to stop cartoonists showing missionaries being boiled in iron pots by natives. "The truth is, cannibals never boiled missionaries. They either ate them raw or roasted them."—*New York Herald Tribune.*

● The schedule in the Shops Bill which forbids the sale of tinned cream on early closing afternoons, but specifically allows the sale of tinned clotted cream has a whimsical scrupulosity about it such as is normally expected only in Purchase Tax tables.—*Financial Times.*

● Neither the Worcestershire county horticultural officer nor the director of the national fruit trials has been able to identify fruit which grows on a tree in Kidderminster. The fruit is yellow-green with bright red streaks; it looks like an apple but tastes like a pear.—*Manchester Guardian.*

● Dear Mr. Todd: We note that you have made a number of recent statements to the effect that popcorn is not a fitting food to eat while viewing your new epic, "Around the World in 80 Days." Sir, speaking of popcorn in this manner is tantamount to refusing to salute the American flag! This, plus the "world theme" of your film smacks of anti-American sentiment—in fact, it sounds definitely COMMUNISTIC!—*Open letter in the Popcorn Merchandiser.*

NEWS FOR IMPORTERS

Japanese foods.—Following the recent conclusion of the Anglo-Japanese trade and payments arrangements new quotas have been established for the import from Japan of *inter alia*: canned tuna (£500,000), and canned pilchards (£30,000).

The agreement also renews the quotas for the import from Japan of *inter alia*: canned peaches (£85,000).

Licences to import the balance of the canned salmon quota have already been issued in accordance with the arrangements previously announced in Notice to Importers No. 798. These quotas are all c.i.f. and are for imports during the period ending September 30, 1957.

In addition, certain goods from Japan are placed on the Open General Licence. These include frozen salmon, and vitamin oils, which were formerly the subject of quotas. Imports of canned crab, canned mandarin oranges and whale oil will also be admissible without quantitative restriction but under open individual licences. Details of the licensing arrangements are given in Notice to Importers No.'s 813 and 814 dated April 3, 1957, issued by the Import Licensing Branch of the Board of Trade.

Fish eggs and animal feedstuffs.—The Board of Trade have announced certain minor amendments of the Open General Licence which took effect from April 25. These amendments clarify the arrangements for the import of animal feedingstuffs. They also add to the list of goods for which no individual licence is required; live fish eggs from any country.

Full details are given in Notice to Importers No. 815 issued by the Import Licensing Branch of the Board of Trade on April 3, 1957.

Warwick sell Pressoturn equipment

Pressoturn, Ltd., announce that the home sales of their light metal containers and related equipment are being handled by their associates, the Warwick Production Co., Ltd.

The change in policy has been decided upon in order to enable the company to cope with the current expansion of both its overseas activities and the work of its bulk materials handling division.

Pressoturn, Ltd., are probably best known for their pioneer work in the introduction of hygienic aluminium containers and equipment to the fishing industry.

The company also holds the manufacturing and sales licence for the *Tote* system of bulk materials handling (recently introduced from the U.S.A.) for the U.K., British Commonwealth, and Europe.

New wholesale depot for Kraft Foods at Bristol.

Kraft's new depots

A chain of nine food distribution depots for Kraft Foods, Ltd., has been erected in various parts of Britain with the aid of *Arcon* prefabricated building components, by Taylor Woodrow (Building Exports), Ltd.

Work on the first depot began in September, 1955 and all nine have now been completed. The main structure in each case is a standard, steel-framed multi-span storage building structure. Office accommodation built in traditional forms of construction is also incorporated and a considerable amount of equipment including modern refrigeration plant was also installed. The total enclosed space provided by the nine depots is an area of over 100,000 sq. ft.

"Glyceryl Monostearate in Food"

The structural formulae of the mono-glycerides in the above article (FOOD MANUFACTURE, April, p. 165) were wrongly labelled. The formula marked β is of course α mono-glyceride and *vice-versa*. The third formula is normally called α' mono-glyceride.

Unilever Profits rise to £47 million

The consolidated net profit for Unilever, Ltd., and Unilever N.V. rose by over £2 million to £47,133,000 in 1956. The turnover for the year amounted to £1,671 million (£1,515 million). The capital employed rose to £470,619,000.

New projects totalling £37 million were approved during 1956 including £925,000 to be spent on the extension of a plant for the manufacture of speciality fats at Silvertown, £293,000 for the modernisation and extension of margarine plant at Purfleet and Bromborough and £383,000 for a margarine plant and storage facilities at Los Angeles and Edgewater, U.S.A.

By far the highest amount is to be spent on the extension of processing and storage facilities for frozen foods in this country. This will cost the company £1,902,000.

Other plans for the expansion of Unilever's food interests include the first stage of modernising Wall's ice cream factory at Godley (£264,000); the modernisation and extension of the meat products factory in London (£441,000); the construction of ice cream depots and cold stores in the U.K. (£517,000); the extension of ice cream plant and cold storage at Hamburg and the provision of ice cream depots and customers' refrigerators in Germany (£374,000); the extension of facilities for meat products and dried soups in the Netherlands (£504,000) and the provision of tea-bagging machines for the U.S.A. (£367,000).

The company's food interests continue to prosper and the advance made by Birds Eye frozen foods was outstanding. In 1956 total sales of food products (excluding margarine and other edible fats) rose from £138,179,000 to £152,956,000. In spite of the bad summer the total sales of Batchelors **canned products** exceeded their 1954 record. Associated Canners also had a profitable year, mainly because of the greater freedom given to them for the importation of their traditional lines of canned fish. A poor **herring** catch affected the turnover and profits of the German trawling business, but these were largely offset by higher returns from fish processing and selling businesses. Mac Fisheries improved their trade in the U.K.

The poor summer affected Wall's sales of **ice cream** but this was partly offset by a sharp rise in the sale of fruit ices. In Germany ice cream sales made further progress. The sales of Wall's **sausages, pies** and **meat products** increased and so did those of Hartog's meat and meat products in the Netherlands.

Soup mixes had a successful year nearly everywhere, particularly in this country, and new varieties were introduced in most countries. Liptons improved upon their previous record sales in the U.S.A. and also increased their share of the tea market, although sales of tea in North America generally remained stationary.

As far as **margarine** and other edible fats were concerned, the chief feature of the year was the success of the best quality margarines. Butter mixtures also did well. Rising costs have squeezed profit margins in some countries and the total increase in tonnage was less than in 1955, chiefly because the rate of increase of margarine sales in Germany was slower, but in general profitability has been maintained. The sales of edible fats rose from 1,589,000 tons in 1955 to 1,602,000 tons.

In Britain, **Summer County** is now the leading butter mixture and this had a successful year. Total sales of margarine brands were slightly higher in a market which did not expand, and the sales of compound cooking fats were reduced by the large quantities of cheap lard which became available.

In the Netherlands, the total sales of edible fats were higher and Unilever's brands, **Blue Band**, **Planta** and **Diamant** more than maintained their share of the market.

The total turnover in edible fats was slightly higher in Germany where the success of Unilever's best quality margarine **Rama** continued, partly at the expense of the standard quality brand **Sanella** and some other brands. In Italy a table margarine was successfully launched and the introduction of a high quality margarine in Finland brought about a sharp rise in sales. In Austria, where Unilever have regained possession of their Atzgersdorf factory in the former Russian zone, the quality of the leading margarine has been improved and sales have increased substantially.

The introduction of the butter mixture **Imperial** improved margarine sales in the U.S.A. and although the sales of compound cooking fats fell, the position of the edible fats business in total improved. Other businesses in Turkey, Malaya and the Philippines did well and in South Africa where heavy marketing expenditure was incurred, turnover rose substantially.

Analysts' officers

The following officers and members of council were elected at the 83rd annual meeting of the Society of Analytical Chemistry for the forthcoming year:

President: J. H. Hamence; *Past Presidents serving on the Council:* D. W. Kent-Jones, J. R. Nicholls, G. Taylor and K. A. Williams; *Vice-Presidents:* N. L. Allport, J. Haslam and A. A. Smales; *Hon. Treasurer:* A. J. Amos; *Hon. Secretary:* R. E. Stuckey; *Hon. Assistant Secretary:* S. A. Price. *Other members of Council:* D. C. M. Adamson, S. G. Burgess, R. C. Chirnside, W. Cule Davies, D. C. Garratt, H. M. N. H. Irving, E. Q. Laws, D. D. Moir, F. C. J. Poulton, J. G. Sherratt and A. F. Williams.

People

MR. D. COLLINS has been appointed area manager of the Scottish division by Smedley's, Ltd. Mr. Collins, who served in the Royal Engineers during the war, joined Smedley's in February 1953 as representative for Cheshire. Before this appointment he was sales supervisor for the whole of England for a well-known Manchester food company.

■

PROF. A. C. FRAZER, president of the British Food Manufacturing Industries Research Association, has been appointed by the World Health Organisation as a member of its panel of food experts. Professor of Medical Biochemistry and Pharmacology in the University of Birmingham, he will hold his additional appointment with the W.H.O. for five years.

■

MR. T. S. DICKINSON, has been appointed as chairman and managing director of the General Engineering Co. (Radcliffe), Ltd., following the death in January of the former chairman, MR. S. TAYLOR. Mr. Dickinson joined the company in 1921, was appointed technical director in 1944, and joined the board in 1946. The new chairman is president of the Junior Institution of Engineers N. W. section.

■

MR. B. W. CHARMAN has been appointed general manager of Rhoden Partners, Ltd. Since Mr. Charman joined the company in 1955, he has been its chief draughtsman. Before this, he held senior appointments with engineering companies specialising in the design and manufacture of automatic transfer machines, and materials handling and processing equipment.

■

DR. G. D. ROSEN has been appointed as nutritional adviser to Pfizer, Ltd. The post is a new one. Since 1949, Dr. Rosen has been a research biochemist with J. Bibby and Sons, Ltd., where he has carried out physico-chemical and nutritional research on proteins and fats and on the formulation and manufacture of animal feeds. Previously he held an appointment in the food products division of Lever Bros., Ltd.

■

Mr. W. R. Owen, who was recently promoted from manager of the Sheffield branch office of Honeywell-Brown, Ltd., to manager for the North East region, will now be responsible for opening and staffing additional offices in this area and for forwarding recommendations for extensions to the range of equipment available. MR. A. HAGUE, Mr. Owen's deputy for the past three years, succeeds him as manager of the Sheffield office.

Mr. E. W. K. Hewitt

MR. HAROLD GIBSON, manager of Brook Motors Sheffield sales office for 26 years, retired at the end of March and has been succeeded by MR. BRAILSFORD SYKES, formerly technical sales engineer. Mr. Sykes is a former Brook apprentice and has 18 years' service with the company. Another Brook apprentice-trained salesman, MR. E. NICHOLSON, moves to Sheffield as sales engineer. He was formerly in the Huddersfield sales office.

■

MR. H. L. BRADFER-LAWRENCE has been elected chairman of the Brewers' Society in succession to COL. J. ALISTER EADIE, who has resigned owing to ill health. Mr. Bradfer-Lawrence entered the brewing industry in 1910 and is chairman and joint managing director of Hammonds United Breweries. He is also a director of the Guardian Assurance Company, and other companies.

LT.-COL. W. H. KINGSMILL was elected vice-chairman.

■

MR. G. L. SALTON, vice-chairman and managing director of Van den Berghs and Jurgens, Ltd., is retiring after 45 years with the company and its associates. During the period of rationing from 1940-54, he played an important part as vice-chairman of Marcom, Ltd., and of the joint Executive Committee of Margarine and Compound Cooking Fats Manufacturers. He was also chairman of the Refiners' (Oils and Fats) National Association. For the past few years, he has been president of the Margarine Association and also a member of the Council of the Association of Manufacturers of Shortening and Compound.

MR. CLIVE VAN DEN BERGH is taking up a new appointment as chairman of the Unilever Companies in Brazil, early this month. For the past eight years he had been a managing director of Van den Berghs and Jurgens, Ltd.

He joined Van den Berghs, Ltd., in 1929, and after a period of training worked as assistant sales manager of the southern division of Van den Berghs and Jurgens, Ltd., until April 1939, when he was appointed managing director of the Craigmillar Creamery Co., Ltd., where he remained until rationing and industrial control was introduced in 1940. In 1950 he became chairman of Van den Berghs, Ltd., and Craigmillar and British Creameries, Ltd.

■

DR. V. G. W. HARRISON, has been appointed Director of Research of the Printing, Packaging and Allied Trades Research Association. He succeeds DR. G. L. RIDDELL, who has left to join Albert E. Reed and Co., Ltd., as head of their packaging research and development division.

■

MR. BRUCE W. COOK, at present factory manager at the T. Wall and Sons (Meat Products), Godley factory, will in due course become site manager of the West London meat products' and bacon factories at Willesden. This is a new post. Mr. Cook will be succeeded as meat factory manager at Godley by MR. M. G. GRAINER.

MR. J. D. ANDERSON and MR. M. M. MUFFETT will be responsible to the London factory site manager, as production manager (meat products) and production manager (slaughterhouse and curing) respectively.

■

MR. VERNON J. TILLEY, F.R.I.C., chairman, managing director and chief chemist of Stevenson and Howell, Ltd., has retired from his position as managing director and from the board. His services will continue to be available in an advisory capacity. Mr. Tilley has been with the company for 48 years and has been a member of the board for 40 years. He will be succeeded by MR. ARTHUR J. STEVENSON, a son of the joint founder of the business, who has been for many years a senior executive and director of the company.

■

MR. J. I. BERNARD has been appointed director and secretary of the British Electrical Development Association in succession to MR. V. W. DALE, who intimated his impending resignation some months ago on account of health considerations but will continue to be associated with E.D.A., until July 1, in order to conclude existing commitments. Mr. Bernard joined the staff of E.D.A. in 1928 and has been its chief technical officer since 1936.

Mr. Bernard was the author of many of the early E.D.A. reports on the use of electricity for water heating and cooking.

SIR HENRY ROSS has been appointed a director of White Horse Distillers and has also been elected chairman.

MR. K. G. SINCLAIR has been appointed chairman of Griffin and George, Ltd., the laboratory furnishers.

MR. V. J. BURDEN, has been appointed personnel officer for the new £2½ million food factory Batchelors are building at Ashford, Kent.

MR. JAMES ALEXANDER LUMSDEN of Maclay Murray and Spens, Glasgow solicitors, has been appointed to the board of directors of G. and J. Weir, Ltd.

MR. R. B. REEVE, publicity manager of Ransomes Sims and Jefferies, Ltd., has retired after 44 years' service with the firm. He is succeeded by MR. D. H. STOCKER, who will co-ordinate publicity, advertising and public relations duties.

MR. G. C. H. MATTHEY has been elected chairman of Johnson, Matthey and Co., Ltd., following the recent death of MR. H. W. P. MATTHEY. Mr. G. C. H. Matthey was appointed a joint managing director of the company in 1913, and served in this capacity for 35 years.

MR. J. M. BRIDGES is the new personnel manager for T. Wall and Sons (Ice Cream), Ltd., with MR. F. W. SMITH as his assistant. MR. E. A. KEEGAN is now personnel manager for T. Wall and Sons (Meat Products), Ltd., assisted by MR. A. E. H. SWAISLANDS and MR. M. W. EAGLETON.

MR. E. W. K. HEWITT has been appointed the new sales manager for British Cod Liver Oils, Ltd., with the responsibility of marketing about half the total world's supply of cod liver oil. Mr. Hewitt was formerly sales controller with Quaker Oats, Ltd. More recently he was the marketing manager for Western Margarine, Ltd.

S.D.T. honours Prof. Kay

The Society of Dairy Technology has announced the award of its Gold Medal to Prof. H. D. Kay, F.R.S., director of the National Institute for Research in Dairying. The award has been made in recognition of Prof. Kay's distinguished service to the dairy industry throughout the past 25 years, and to the Society, of which he was founder-president, since its formation in 1943.

The Gold Medal will be presented to Prof. Kay at a special meeting of the Society in London on October 21.

Erections and Extensions

Cerebos, Ltd., are having a warehouse built at Daybrook, Nottingham.

J. Muir and Co., are having plans prepared for the erection of a bakery at Wallace Drive, Cambuslang, Scotland.

Danish Bacon Co., Ltd., have had plans approved to build an extension to their food warehouse at Stanley Road, Stretford.

Oxo, Ltd., are planning to build a warehouse, office and garage at Yetholm Road, Gateshead-on-Tyne.

Sevenex Bakeries, Ltd., have had plans approved for the building of extensions to their bakery at Oldfield Lane, Greenford, Middlesex.

MacFarlane, Lang and Co., Ltd., biscuit manufacturers, are planning an extension to their packing department at Clydeford Drive, Glasgow.

Buchanans Flour Mills, Ltd., have plans for the erection of a warehouse, office building and canteen at Flour Mills Dock, Birkenhead, Cheshire.

A. and F. Bentley, Ltd., bakers, have had plans approved to reconstruct and extend their bakery in Portland Road, South Norwood, London, S.E.

Hugh Baird and Sons, Ltd., maltsters, have had plans drawn up for the erection of steel silos at Vintner Street, Glasgow.

Plans have been indicated for the establishment of a lobster processing plant in the Fife coast area to handle the growing landings of Norway lobsters which rose from 1,153 cwt. in 1950 to 8,500 cwt. in 1955 in this one area alone. At present there is no processing plant in the area and the Fife County Planning Officer has arranged a meeting with a firm of canners and processors to discuss the position.

Stanley Co-operative Society, Ltd., have had plans prepared for the erection of a mineral water depot at Park Road, South Moor, Stanley, Co. Durham.

Tees-side Farmers, Ltd., are planning to build a £10,000 factory for pre-packing potatoes on the Aycliffe Trading Estate, Darlington.

Mellors, Ltd., mustard manufacturers, have had plans approved to build an extension to their storage premises at Alexandra Mills, Mill Royd Street, Brighouse, Yorks.

Carsons Chocolates, Ltd., have opened a newly constructed office, canteen and production block as an extension to their factory at Fishponds, Bristol.

Randalls (Wimbledon), Ltd., manufacturing confectioners, have received planning permission to build a two-storey administration premises at Watts Yard, Upper Green East, Mitcham, Surrey.

Leith Dock Commission are erecting further grain storage facilities at Leith Imperial Dock to meet the growing pressure of landings for the baking, biscuit making and allied industries. The extension will increase storage capacity from 20,000 tons to 35,000 tons and increase the total storage capacity in the port to 71,000 tons.

Birds Eye Foods, Ltd., is establishing a further vining station at Tibberton near Donnington, Salop and the area of land for pea cultivation is to be increased in that area by nearly 600 acres.

Fish packed at sea

Two new Polish trawlers on which fish will be packed at sea, are joining the Great Yarmouth herring fleet. They are Dutch-type lugger-trawlers and the Dutch method of dealing with herring will be used. British fishermen, with Dutch experts to help them, will gut, salt and pack the fish in barrels on board. The advantage is that the vessels can thus remain at sea until their full capacity has been reached instead.

York Shipley sales conference

The York Shipley, Ltd., sales conference, held at Hendon Hall Hotel recently, saw the largest number of York distributors and salesmen ever gathered at one conference.

Those attending were greeted by Mr. R. H. Hemmings, director, and Mr. E. W. Harrison, the southern area supervisor. They were also given a pre-view of some new York equipment.

The conference concluded with a dinner and dance.

COMPANY PROFITS AND PROSPECTS

Record results for tea merchants

The favourable state of the tea market is reflected in the accounts of two of the largest merchants. Twining Crosfield and Co., Ltd., showed a record profit of £158,184 (£48,544 for 14 months) and the dividend rose to 18% on larger capital (equal to 13 5/7% p.a. on old capital). The results were due partly to the acquisition of various subsidiaries and partly to being able to trade in a profitable period. The chairman, Mr. H. W. Backhouse, was understandably cautious but Twinings intend to develop the trade still further and are extending their processing plant and warehouse.

The group gross profits of Typhoo Tea (Holdings), Ltd., also rose sharply from £852,000 to a record £1·38 million and the dividend on capital is up from the equivalent of 13⅓% to 17½%.

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Lower jam profits

Group profits of Williams and Woods, Ltd., the Dublin jam and confectionery manufacturers dropped from £22,748 to £19,832. A final Ordinary dividend of 7½% (the same plus a 2½% centenary bonus) making 10% for the year (12½%) was made.

■

Higher meat profits

Higher net profit and dividend were announced by Hugon and Co., Ltd., meat products manufacturers. The taxed net profit was £137,541 (£125,739) and the dividend rose from 17½% to 20%.

■

Freedom for bourbon urged

American distillers' contention that the U.K. should import more bourbon and rye whisky in view of the large exports to the U.S. of Scotch whisky (see FOOD MANUFACTURE, March 1957, p. 134) was supported by Mr. R. M. Teacher, chairman of Teachers (Distillers), Ltd., at the company's annual meeting. He pointed out that Scotch whisky is still the largest dollar earner but that sales in Canada, for example, have been declining for the past few years largely because of the maintenance by some provincial Governments of a considerable price differential between Scotch and domestic whisky. He warned that in both the U.S.A. and Canada, sales of domestic whisky and vodka are increasing.

The year ended September 30, 1956, was a successful one for the company who had a net profit of £291,415 an increase of £21,646 over the last year. Because of the higher profit last year's final dividend of 7½% has been increased by 2½% making with the interim dividend already paid, a total of 15% for the year.

During the year, the company have started negotiations to acquire the cooperage business of C. S. Whitelaw, Ltd.

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Cow and Gate profits climb

Group profits of Cow and Gate, Ltd., infant and invalid food manufacturers, rose by £283,000 to £1·37 million for the year ended September 30, 1956. The net profit was £704,293 compared with £576,803 last year. The 17½% dividend was repeated.

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Profitable wines

A final dividend of 15% making a total of 20% (17½%) was made by Victoria Wine Co., Ltd. (controlled by Taylor Walker). The net profit for 1956 was £116,893 (£109,917).

■

Fenner's better profits

The consolidated net profit of J. H. Fenner and Co. (Holdings), Ltd., in 1956 rose from £407,914 to £428,096 last year, according to a joint statement by the chairman, Mr. C. Bradshaw and the deputy chairman and managing director, Mr. S. B. Hainsworth. A 12½% Ordinary dividend was paid.

During the year, the statement continued, the company's V-belt pulleys with *Taper-Lock* bushes have been standardised by most of the leading industries in the U.K. A new £350,000 building is being erected on their Marfleet site at Hull, where the entire range of mechanical power transmission equipment will be centralised. Daily deliveries will be made to the 18 stock-carrying branches of the company.

Two more sizes of *Torque-Arm* speed reducers were added to the range, making six in all, and a limited range of *Taper-Lock* chain drives has been made available for the first time in the U.K.

Biggest Churns for Biggest Butter Works

One of the world's largest butter churns has been installed in the world's largest butter factory—Wilts United Dairies, Ltd., at Chard, Somerset. The churn, made from hard, odourless Kauri pine, is seen here being delivered at London Docks from New Zealand where it was made. Three similar churns are already at the factory producing between 45 to 50 tons of butter per day. When assembled the churn weighs, unladen, 15 tons and makes 2½ tons of butter every 70 to 90 min. It measures 9½ ft. in diameter and 9 ft. in length.

S.C.I. Food Group's new officers

The committee of the Food Group of the Society of Chemical Industry has appointed the following officers for the session 1957-58:

Chairman: Dr. J. R. Nicholls; *Vice-Chairman:* Dr. A. J. Amos; *Hon. Treasurer:* Mr. R. Harold Morgan; *Jt. Hon. Secretaries:* Dr. A. E. Bender, Mr. J. A. Beesley; *Hon. Recorder:* Dr. H. Egan.

Bakery Equipment Manufacturers' officers

The 22nd annual general meeting of the Bakery Equipment Manufacturers Society, Ltd., was held in London recently. The following were appointed *vice-presidents*:

Mr. Maurice C. Cole, F.C.A., Mr. T. B. Collins, Mr. A. W. Dumbrill and Mr. J. A. Pelkman.

Mr. Cole, of Cole, Dickin and Hills, relinquished the position of *secretary* and *treasurer*, which he had held since the formation of the society in 1934. Henceforth the secretariat of the Food Machinery Association, to which the Society became affiliated in 1947, will be responsible for all the Society's affairs.

The retiring members of the council, Mr. C. N. Brown (Baker Perkins, Ltd.) and Mr. G. R. George (James Cruickshank, Ltd.) were re-elected. The present composition of the council is as follows:

Mr. C. N. Brown (*Chairman*), Baker Perkins, Ltd.; Mr. G. R. George (*Vice-Chairman*), James Cruickshank, Ltd.; Mr. F. F. Fox, Record Bakery Equipment Co., Ltd.; Mr. N. J. Glanfield, Hobart Manufacturing Co., Ltd.; Mr. A. E. Kent, Kent and Co. (Globe Works), Ltd., and Mr. John Pelkman, John Pelkman Engineering Co., Ltd.

The president of the Society is Mr. A. I. Baker, C.B.E., J.P. of Baker Perkins, Ltd.

Food News Overseas

New cake factory

The Italian company Motta Milano, plan to build a factory at Campi Flegrei, Naples, for the production of "panettoni," biscuits, and all varieties of cakes.

Nigeria may start sugar refinery

The possibility of establishing a sugar refining industry in Nigeria is being explored by the Federal and Regional Governments in conjunction with a British firm.

German-equipped sugar refinery for Persia

A privately owned sugar refinery, in which the Royal Estates Administration are minority shareholders, is being set up in Ahwaz, Persia. A German firm (Bukawolf), who are also shareholders, will provide the machinery and know-how. It will have an annual capacity of 30,000 tons and will start by using imported sugar but may eventually use locally produced cane sugar.

Caffeine from tea waste

A scheme for the manufacture of caffeine from tea waste has been prepared by the Small Industries Organisation of the Indian Ministry of Commerce and Consumer Industries.

India produces more than 600 million lb. of tea annually, about a quarter of which is used to meet local demands. Since the demand for caffeine in the country is about 30,000 lb. a year the future of the new industry may be considered bright.

It is planned to use Indian equipment for the factory.

Flying tea factory

A prefabricated steel tea factory was flown from Britain to New Guinea recently. It will be the first tea factory to be built in the territories of Papua and New Guinea.

The Australian air line, Qantas, estimated that 43 loads would be required to lift the building and its machinery to Garaina between Lae and Port Moresby.

It has been estimated that 100 tons of black tea will be placed on the market annually when a new tea plantation in the area is in full production and when the factory is operating.

Canada Eats "Acronized" Fish

Main fish-processing plants at Lunenburg, Halifax, Nova Scotia, began commercial use recently of the new "Acronize" formulation for keeping fish fresh, under the close observation of British and American food technicians. Above, British scientist, Dr. John H. Taylor, examines treated fish at Lunenburg sea products plant. Dr. Taylor made a flying trip from England to observe Canadian commercial usage of the new formulation, which is expected to reduce sharply Canada's fish-spoilage losses, estimated at some 15% of its million-ton annual catch. Canada's high-seas fishing craft can now also use "Acronized" ice to keep fish cargoes fresh on lengthy trips.

Japanese whale factory in Chile

The Taiyo Fishery Company of Japan is reported to have requested Government permission to import machinery worth U.S. $600,000 to equip a whale processing plant to be jointly run by themselves and the Chilean firm, Compania Pesquera del Sur. The location of the plant has not yet been announced.

The whale processing plant of the Compania Industrial at Caleto Nolle near Iquique in Chile was inaugurated recently. It employs 300 workers.

Salt-free foods

A wide range of saltless food has been produced by the joint efforts and research of five Swiss food manufacturing firms. It is claimed to make it possible to follow a strict diet, under medical control, but with the help of varied dishes possessing an agreeable taste.

English cheeses for Holland

An office has been opened in Amsterdam by the English Country Cheese Council, who are undertaking an export campaign in Holland as a pilot scheme to test the acceptability of English cheeses to European markets.

Consumption of cheese in Holland is considerably higher per head than in the U.K., and, whilst the Dutch are famed for their own cheeses, it has been estimated that their demand for foreign cheeses has approximately doubled during the past year.

Fishery science meeting

A joint meeting of fishery scientists has been planned by the International Commission for the North Atlantic Fisheries, the International Council for the Exploration of the Sea, and the Food and Agriculture Organisation (FAO). It will take place in Lisbon from May 27 to June 3.

It is expected that more than 50 scientific papers dealing with the effects of fishing, fishing effort and selection in fishing will be presented. Scientists from at least 15 different countries will participate in the meeting.

New meat dehydration process

A new process for dehydrating meat has been announced by the New Zealand Department of Scientific and Industrial Research. A small commercial plant has been installed at the Wellington Meat Export Co.'s works at Ngauranga, sponsored by the New Zealand Meat Producers' Board.

The meat is boned, trimmed, frozen, sliced, and finally dehydrated in molten fat under vacuum, at 120°F. rising to 160°F., to remove all trace of water. It is then compressed into tins.

It is proposed to dehydrate about 10 tons of beef and 1 ton of mutton, of which a trial shipment of 5 tons will come to the U.K. for manufactured meat products.

Glycine in poultry food

Research is being carried out at the University of Tennessee on feeding poultry with synthetic glycine made by the Monsanto Chemical Co. Glycine is one of the 11 amino acids essential to poultry, and these experiments form part of an attempt to make a rich feeding material by mixing pure amino acids.

International nutrition congress

The Fourth International Congress of Nutrition, to be held under the auspices of the International Union of Nutritional Sciences, will take place in Paris from July 26 to August 1 next. For information about the Congress, early application should be made to Prof. E. Terroine, 4ème Congrès International de Nutrition, Centre National de Coordination des Études et Recherches sur la Nutrition et l'Alimentation, 71, Boulevard Péreire, Paris, 17e, France. Information about the International Union of Nutritional Sciences can be obtained from the Secretary-General, Dr. Leslie J. Harris, Dunn Nutritional Laboratory, Milton Road, Cambridge.

Honduras milk powder factory

A milk powder factory is to be erected at San Pedro Sula in the Republic of Honduras by the Banco Nacional de Fomento (National Development Bank) in association with the United Nations Children's Emergency Fund. Besides milk powder for the national school milk programme, pasteurised milk for the local market and cheese, cream, ice cream, etc., for the national market are to be produced.

The total expenditure is expected to be about U.S. $550,000 of which UNICEF's contribution will be about $200,000. The bank is interested in communicating with manufacturers of dairy equipment.

Panamanian milk processing

A contract was signed recently by the Industrias Lacteas, S.A. with the Panamanian Government for the enlargement of its milk processing activities. Under the contract the firm has undertaken to invest at least U.S. $1 million and the Government has granted it exemption from import duty for its factory equipment and operating materials.

An excess of milk production over the requirements of the Compania Panamena de Alimentos Lacteos, one of the two main milk processing firms in Panama, has caused some concern. The other principal firm, Cia. Chiricana de Leche, will now take over the excess for processing into powdered milk for local consumption.

Technical Press Review

MAY

Dairy Engineering.—Rider Electric Vehicles for Delivering Dairy Products; Production of Orange and Other Beverages by the Dairyman, 2; Research on Foil for Dairy Use; A New Crate Stacking Machine; A Novel Bottle Washing Installation in Holland; Care and Maintenance of Electric Motors in Dairies.

World Crops.—Jungle Clearance and Reclamation; The Engineer to the Rescue; Sprinkler Irrigation; Water for the Crops of South Africa; Irrigation of Agricultural Lands with Water from Deep Wells.

Manufacturing Chemist.—Review of the Instruments, Electronics and Automation Exhibition; Instrumentation; Surface Activity Congress; Synthetic Analgesics. Progress Reports: Disinfectants, Hormones, Perfumery, Detergents.

Paint Manufacture.—Mechanical Handling in the Paint Industry; Automatic Filling; Fluid Handling; Mechanical Equipment for Producing Natural Pigments.

Automation Progress.—The Work of an Automation Consultant; A General Purpose Analogue Computer; Chromatography; Data Processing Controls Manufacture; Force Balance Methods Integrate Process Control; Digital Control of Weighing; Automatic Feed and Transfer for Resistance Welding Machines; Electronic Balancing of Rotary Machines; Automatic Gauging of Small Components; Guide to the Instruments, Electronics and Automation Exhibition.

Atomics.—Harwell's Research Reactors; Reactor Material Problems; Polonium—the Neglected Element; India's Nuclear Programme; The Story of Hermes; Reactor Monitoring; Nuclear Instrumentation.

Chemical and Process Engineering.—Safe Handling of Caustic Soda; Manufacture of Fertilisers and Cattle Food from Blood; Materials Handling in the Chemical Industry; Avoidance of Stress Corrosion Cracking in Austenitic Stainless Steel Equipment; Heat Transfer in Spiral Heat Exchangers; The Chemical Engineer's Contribution to Clean Air.

Petroleum.—Modern Techniques with Finished Products; Mechanical Handling of Stores; Modern Packing; Container Research; Aerosol Packaging; The Search for Oil in Turkey.

For specimen copies, write to Stratford House, Eden Street, London, N.W.1.

New Companies

Robertson's Cooperage, Ltd. (31963.) 1, Queen's Terrace, Aberdeen. To acquire and carry on the bus. of John Robertson and Sons, coopers, cask mchts., etc., Hanover Lane and Albion Street, Aberdeen. £5,000. Dirs.: T. S. Sutherland, H. G. Hunter, A. B. Williamson and A. G. Hall.

T. G. Roddick and Co., Ltd. (571224.) 15, Fenwick Street, Liverpool, 2. Grain mchts., etc. £5,000. Dirs.: J. S. S. Roddick and A. H. Stenhouse.

S. Rogers and Son, Ltd. (570833.) Hermit Street, Upper Gornal, Staffs. Wholesale grocers. £5,000. Permt. dirs.: S. and Kathleen Rogers.

Sandy Fishing Co., Ltd. (571124.) Fish Dock Road, Fish Docks, Grimsby. £300. Dirs.: C. E. Proctor and H. M. L. Hansen.

R. H. Simpson (Farmers), Ltd. (31965.) Strawberrybank, Newport-on-Tay, Fife. Farmers, breeders, etc. £100. Dirs.: R. H. Simpson and Mrs. S. B. Simpson.

Suttons (Kingstanding), Ltd. (568870.) 275a, Kings Road, Kingstanding, Birmingham. Growers of and dlrs. in fruit and vegetables, etc. £5,000. Dirs.: G. and Mrs. I. P. Sutton.

Tarbert Loch Fyne Projects, Ltd. (31940.) Tarbert, Argyll. Tomato growers, market gardeners, etc. £10,000. Dirs.: A. C. Mayer, M.B., CH.B., Capt. Peter L. Mackie-Campbell, B. G. MacLellan and A. C. Montgomery.

T. R. Topham and Sons, Ltd. (571227.) Four Crosses, Baschurch, Salop. Egg station. £10,000. Dirs.: T. R. Topham (permt.) and Mrs. O. M. Topham.

Tusons (Lancashire), Ltd. (571066.) 422a, Barton Road, Stretford, Lancs. Wholesale grocers and provn. mchts., etc. £2,000. Dirs.: F. G. and Gladys M. Gray.

Vendormatic, Ltd. (571078.) 6, Sunningdale Drive, Gt. Crosby, Liverpool, 23. Mnfrs. of and dlrs. in automatic and coin-worked machines for the supply of foods, drinks, etc. £100. Subs.: Jean Herbert (co. dir.) and T. A. Herbert (barrister).

G. C. de Ville, Ltd. (569345.) Central Buildings, 13, Glasshouse Street, Nottingham. Offal mchts. and sundriesmen for the butchery trade. £1,000. Dir.: Mrs. V. de Ville.

L. M. Ward and Co., Ltd. (568926.) 300, Ballards Lane, N. Finchley, London, N.12. Caterers, sugar boilers, biscuit mfrs., etc. £3,000. Dirs.: Louisa M. Ward, Phyllis B. Plimmer and B. A. Ward.

T. Weston and Son (Nottingham), Ltd. (569443.) Central Chambers, Derby Street, Leek, Staffs. Licensed cattle slaughterers, etc. £3,000. Dirs.: T. and Mrs. E. Weston and L. and Mrs. A. Weston.

Woolwich and District Grocers' Wholesale Buying Co., Ltd. (571022.) 140, Plumstead Common Road, London, S.E.18. £100. Dirs.: D. Norton, L. H. P. Chasteuneuf and A. Weber.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post. Enquiries cannot be answered by telephone.

Chocolate couvertures

B.8173. *Have you any recipes for chocolate couvertures?* (Altrincham, Cheshire)

The following is a good basic formula:

Cacao liquor	14 lb.
Sugar icing	46 ,,
Milk powder	25 ,,
Cacao butter	15 ,,
Vanillin	1 oz.

Normally, the liquor is produced from blended nibs for the best flavour. A good blend is Bahia, 4 lb.; Ceylon, 4 lb.; Trinidad, 3 lb.; Grenada, 2 lb.

A formula for plain couverture is:

Arriba cacao nibs	25 lb.
Caracas cacao nibs	25 ,,
Trinidad cacao nibs	22 ,,
Cacao butter to be added at conching stage	30 ,,
Finely ground sugar	100 ,,
Cacao butter	14 ,,
Lecithin	0·3% of mass
Vanillin	½ oz.

The Arriba and Caracas beans are roasted at 275°F., the Trinidad at 290°F. The nibs are blended and ground in the liquor mill, then mixed thoroughly with the sugar and 14 lb. cacao butter. The mass is refined and transferred to a mixing kettle, the balance of cacao butter and lecithin added, mixed and placed in pots of the conche, processing for 72 hr. at 160°F. The vanillin is added near the end of the process. The chocolate is tested for fineness on a micro-projector before discharging.

Sticky sweets

B.8143. *Is there any preparation on the market which can be added to high sugar boilings to extend the shelf life and eliminate the possibility of stickiness? We have been told that there is a German powder for this purpose.* (Cleveleys, Lancs.)

We do not know of this German preparation. It seems unlikely that there is any powder which can be incorporated into the boiling itself to control the hygroscopicity of the resulting sweet, as this depends to such a large extent upon the final invert sugar content.

Either icing sugar or starch is often used for dusting the outsides of sweets to prevent stickiness.

Beef or pork?

B.8153. *I am interested in a method for differentiating between meats (e.g. beef, pork, etc.) in cooked and uncooked mixed meat products and wonder if you could indicate where such a method might be explained. I notice that an article "Food Controls in Great Britain," Part VI, by C. G. Daubney* (FOOD MANUFACTURE, *February*, 1952), *outlines a serological method connected with uncooked mixtures. Is an expansion of this outline available and is it applicable to cooked mixtures?* (Co. Mayo, Eire)

The serological method for identifying the species origin of meat cannot be applied to cooked meat because the heated protein loses its species specificity. The source of C. G. Daubney's article was a paper written by H. Proom (of the Wellcome Research Institute), "The Preparation of Precipitating Sera for Identification of Animal Species" (*J. Path. Bact.*, 1943, **45**, 419). The paper contains some information on this point and might interest you.

Information supplied

The Enquiry Service has dealt with requests for names of manufacturers and suppliers of plant, machinery and materials, and also general information as follows:

B.8052. *Processing peanut kernels.* (East Molesey, Surrey)

B.8053. *Ice cream mix.* (London, W.C.2)

B.8054. *Formula for coconut-marshmallow dainty.* (Leicester)

B.8055. *Manufacturers of adhesive tapes.* (Cape Town, S. Africa)

B.8057. *Powder purported to maintain original aroma of foodstuffs.* (London, W.10)

B.8058. *Food yeast and its nutritive value.* (Southern Rhodesia)

B.8059. *High frequency baking of bread.* (Dublin, Eire)

B.8061. *Solidifying goose fat.* (Hulda Javne, Israel)

B.8062. *Manufacturers of mixers for pepper, salt and spices.* (Dublin, Eire)

B.8063. *Manufacturers of colloid mills.* (Dublin, Eire)

B.8064. *Packeted pastry mix and machinery for mixing same in bulk.* (Melbourne, Australia)

B.8065. *Dehydration of onions, garlic, carrots, etc.* (Cape Province, S.A.)

B.8066. *Manufacturers of salt-making machinery.* (Madrid, Spain)

B.8067. *Sugar flower decorations.* (Belfast)

B.8068. *Growing mushrooms in sawdust.* (Nova Scotia, Canada)

B.8069. *Keeping salt dry for potato crisp manufacture.* (Aberdeen)

B.8070. *Suppliers of dehydrated cheese.* (Cambridge)

B.8071. *Cooking potato crisps.* (Co. Cavan, Eire)

B.8072. *Manufacturers of speed reducer.* (New York)

B.8073. *Information on literature, uses, and history of spices.* (Lansdown, Bath)

B.8074. *Automatic butter packing machine.* (Liverpool, 20)

Trade Marks

AVERNA.—756,814. Almond paste, desiccated coconut, coconut flour, coconut paste, macaroon paste, nut kernel paste; chocolate, cocoa, chocolate articles, preparations made principally of chocolate for use in the bakery and confectionery trades; marzipan paste, cake decorations made of marzipan, fondant; preserved ginger (for food); gelatine (for food); marshmallow; sugar icing; and preparations of sugar and glucose for use in the bakery and confectionery trades. **British Fondants, Ltd.,** Avern Works, Avern Road, East Molesey, Surrey.

JIF.—754,614. Edible oils and fats. **Thomas Hedley and Co., Ltd.,** Phœnix Buildings, Collingwood Street, Newcastle-on-Tyne.

SOUTH POINT.—B756,944. Canned fish, fruits and vegetables. **Thomas J. Smith, Ltd.,** 11-12, Fenchurch Street, London, E.C.3.

SUNSPARKLE.—757,861. Fresh and cooked meat; fresh fish, poultry and game, none being live; fruits, vegetables, poultry and game, all being cooked; canned goods and goods preserved by freezing. **Ross Group, Ltd.,** 1, Hutton Road, Grimsby, Lincolnshire.

GOLD PLANET.—758,010. Canned fruits, vegetables, dried fruits, vegetables and butter. **Grocery Wholesalers (Norwich), Ltd.,** Millers Lane West, Norwich, Norfolk.

HAYMAID.—B752,659. Butter. **H. C. Hay and Co., Ltd.,** 16, Great Dover Street, London, S.E.1.

HIGHLAND MASTER. — B751,682. Wines and spirits (beverages). **Craig Mackintosh and Co.,** 164, Howard Street, Glasgow, C.1.

KIMONO.—753,368. Meat; fish, poultry and game (other than live fish, live poultry and live game); meat products, fish products, poultry products and game products (all for food); fruits and vegetables, all being preserved, dried, cooked, bottled or canned; dairy products (for food), artificial cream, edible oils, edible fats; jam and marmalade; jellies (for food); and soups. **Brian, Jenks and Co., Ltd.,** Sabian House, 26-7, Cowcross Street, London, E.C.1.

KRAFT.—749,354. Salad dressing and French dressing. **Kraft Foods, Ltd.,** Silverdale Road, Hayes, Middlesex.

LACHASSE.—B752,366. Wines. **J. Stonehill and Co., Ltd.,** Stonehill House, Bonhill Street, Finsbury, London, E.C.2.

MARIGOLD.—754,081. Canned fruits. **Boustead and Co., Ltd.,** 1, The Embankment, Kuala Lumpur, Malaya, and c/o T. B. Browne, Ltd., 117, Piccadilly, London, W.1.

MIXMASTER.—741,339. Machines for mixing food and mechanical attachments therefor to adapt the machines for vegetable slicing and shredding, meat grinding and food chopping, beverage mixing, potato peeling, butter churning, coffee grinding, silver-ware polishing, pea shelling, can opening and knife sharpening. **Sunbeam Corp.,** 5600, Roosevelt Road, Chicago, Ill., U.S.A., and c/o Frank B. Dehn and Co., Kingsway House, 103, Kingsway, London, W.C.2.

BEEFBURGER.—758,269. Farinaceous cooked foodstuffs filled with beef. **Aerated Bread Co., Ltd.,** 17, Camden Road, London, N.W.1.

FENFARE.—B754,852. Feeding stuffs for horses, cattle, sheep, pigs and poultry. **F. Leach and Sons, Ltd.,** Roller Mills, Wisbech, Cambridgeshire.

PADDY WHACK.—753,151. Bread. **Knowles and Son, Ltd.,** 13, Liverpool Gardens, Worthing, Sussex.

PASA-DOBLE.—753,621. Sherry wines. **Mackenzie and Co., Ltd.,** 20, Eastcheap, London, E.C.3.

POLAR QUEEN.—753,276. Margarine. **Salix Provisions, Ltd.,** Cannongate Works, Perth Road, Wood Green, London, N.22.

RAFLA.—753,188. Cheese spread; and preparations of cheese, ham and onions for spreading on foodstuffs. **Tyne Brand Products, Ltd.,** The Shields Preserving Works, Fish Quay, North Shields, Northumberland.

READYBREK.—B753,330. Cereal preparations for food for human consumption. **J. Lyons and Co., Ltd.,** Cadby Hall, London, W.14.

RIB-NIG.—750,997. Non-alcoholic drinks included in Class 32. **J. Mair, Ltd.,** 414, Green Street, London, E.13.

SHANDEX.—749,379. Wines, spirits (beverages) and liqueurs. **Shandex (Edinburgh), Ltd.,** 8, Kinnoull Street, Perth.

RINGMASTER.—750,849. Wines, spirits (beverages) and liqueurs. **Gilbert and John Greenall, Ltd.,** The Distillery, 26, Bridge Street, Warrington.

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

774,030. H. S. Whiteside and Co., Ltd.: Method of perforating packets or bags made of polythene or like material.

773,719. L. Beaumont: Food containers.

773,736. W. J. A. Jekel: Bottle package.

773,762. Kraft Foods Co., Ltd.: Manufacture of cheese.

773,957. Britannia Engineering Co., Ltd., Marshall Sons and Co., Ltd., and D. Dewar: Tea rolling machines.

774,504, 774,505, 774,506. H. Schroder: Automatic control of dough dividing and kneading machines.

774,547. Armour and Co.: Production of molecularly modified lard.

774,318. W. H. Steckel: Production of fodder from the medullary substances of sugar beet, sugar cane and other sugar-containing plants in the manufacture of sugar.

774,444. Unilever, Ltd.: Food products.

774,267. H. Kelem: Machine for banding meat casings.

774,678. J. G. Jessel: Apparatus for making beverages.

774,775 and 774,776. A. R. Gooda: Beverage dispensing machines.

775,039. G. T. Church: Egg-washing machines.

774,928. Rose Bros. (Gainsborough), Ltd.: Transfer mechanism for wrapping machines.

774,865. Standard Brands, Inc.: Prevention of gel in frozen coffee extract.

775,363. K. Kemper: Mixing or kneading machines.

775,306. H. Knoch: Articles of confectionery.

775,203. B. Stokeley: Sectional cold-room construction.

775,210. H. A. Faerber: Machine for coating with sugar jubes, jellies, and like confections.

775,217. L. Peters: Packaging of beverages.

775,148. J. O. Farrer: Manufacture of sterile concentrated milk.

ABSTRACTS OF BRITISH PATENTS

Plucking machine

A rotor carries fixed and pivoted feather grippers in co-operating pairs operated by stationary cams.—769,000. *R. Cohen.*

Chocolate mould

Two resilient blades scraping the faces of a mould for filled chocolate are inclined to cause the scrapings to converge between them.—769,092. *S.A. Macchine Ind. Dolciaria Carle and Montanari.*

Portable beverage container

A portable beer, etc., container has a rotatably removable sealing lid, a pressurising device and a carrying handle. A carrying handle retains a lid lock in its operative position when the handle is in use.—769,111. *Gaskell and Chambers, Ltd.*

Sausage filling machine

The cover of a high pressure machine includes a sealing ring which is expanded by the internal pressure.—769,142. *Vemag Verdener Maschinen-und Apparatebau Szeigniederlassung der Sudostholz Metz Co., G.m.b.H.*

Vegetable grinder

A centrifugal turbine rotor is partly immersed in liquid containing vegetables, fruit, etc., to produce pulping.—769,167. *M. Gerhardin.*

Sausage casings, etc.

A ligature for binding the ends of a casing comprises a ribbon of ductile material and a relatively soft cover which is slidable lengthwise on the ribbon and extends around its edges.—768,490. *Ideco Inc.*

Bottle, etc., aligner

Before a cylindrical container is labelled, etc., a machine rotates it until the seam is at a given position.—768,686. *Kork-N-Seal, Ltd.*

Cereal grain cleaning machine

An inclined tray(s) with sifting screens and loading and discharging elements is oscillated horizontally and circularly to separate the lighter from the heavier particles of grain.—768,738. *P. Golfetto.*

Bottle closure

A closure for a bottle (*e.g.* for carbonated drinks) with a beaded neck comprises a shell with an inward flange at its mouth and containing a slidable sealing device including a spring-jawed disc carrying a rubber gasket. When the closure is pressed on to a bottle, the sealing device slides in the shell to cause the jaws to spring under the bead and hold the gasket in sealing position, even if the shell is tilted on the neck.—768,804. *M. L. Gold.*

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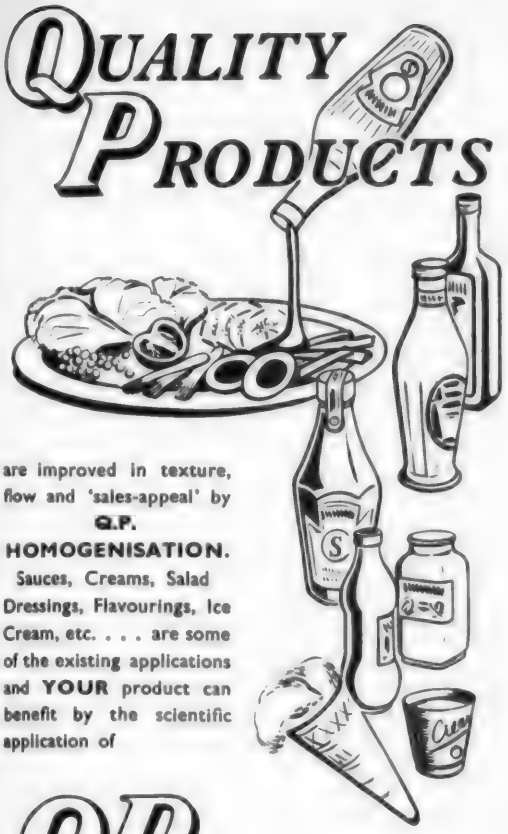

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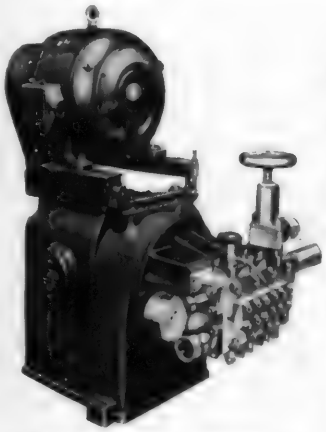

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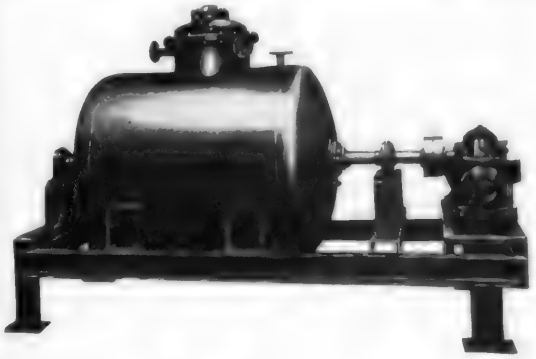

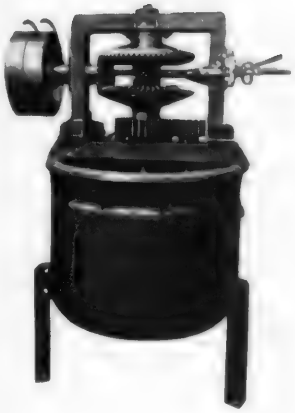

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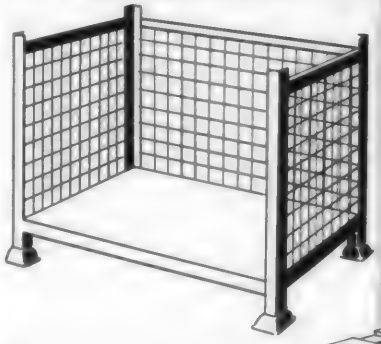
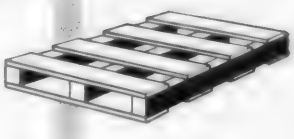


Cage type Stackable Pallets, suitable for cartoned foods, biscuits etc.



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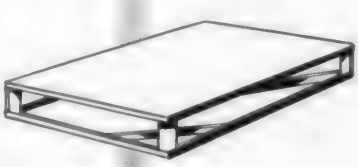

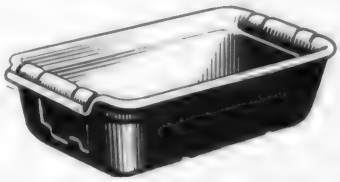

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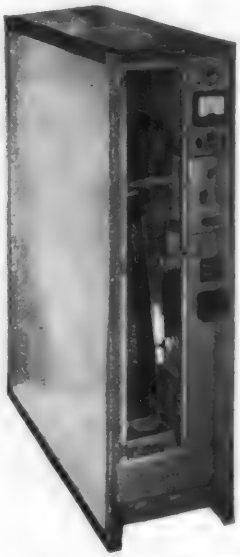

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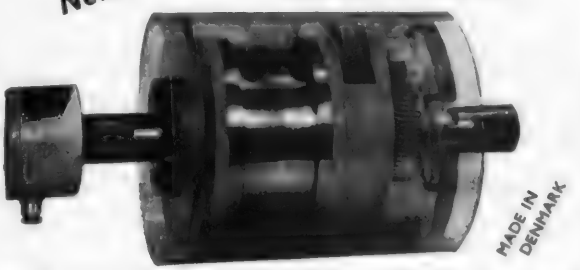

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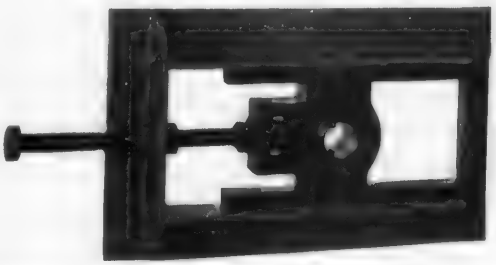

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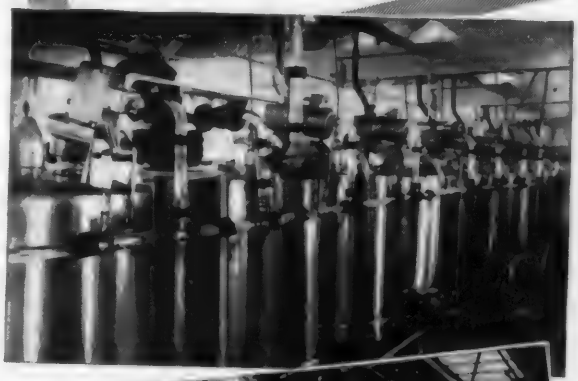

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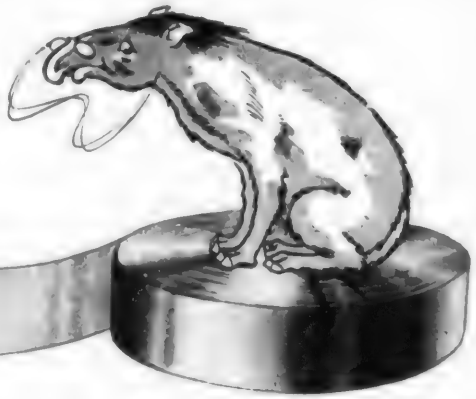

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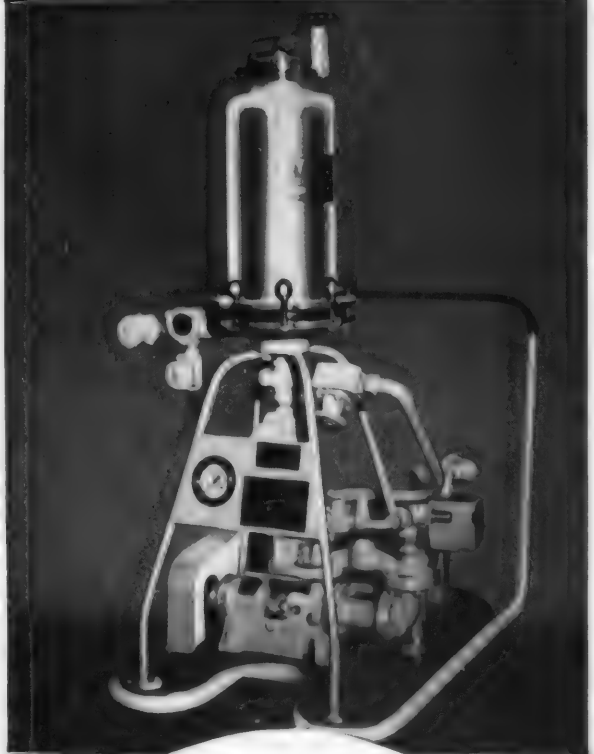

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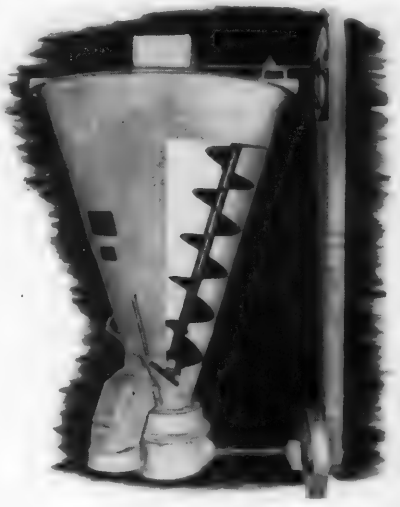

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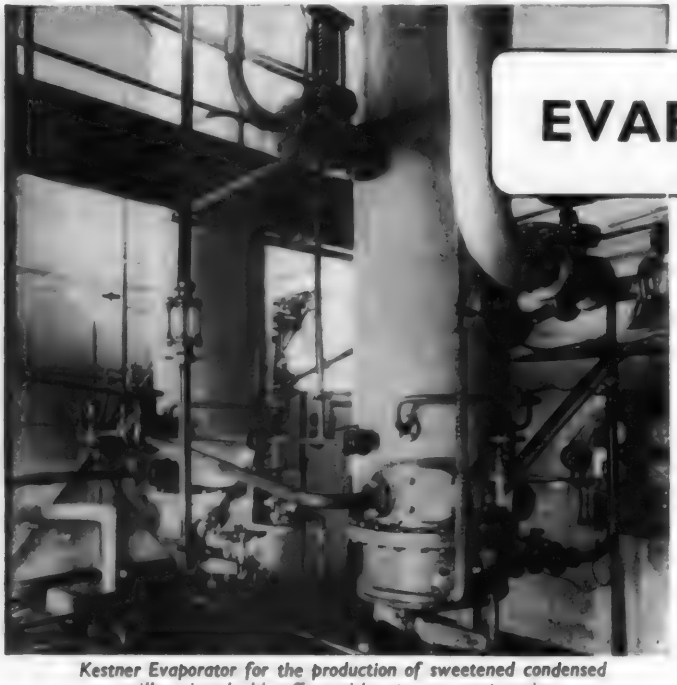

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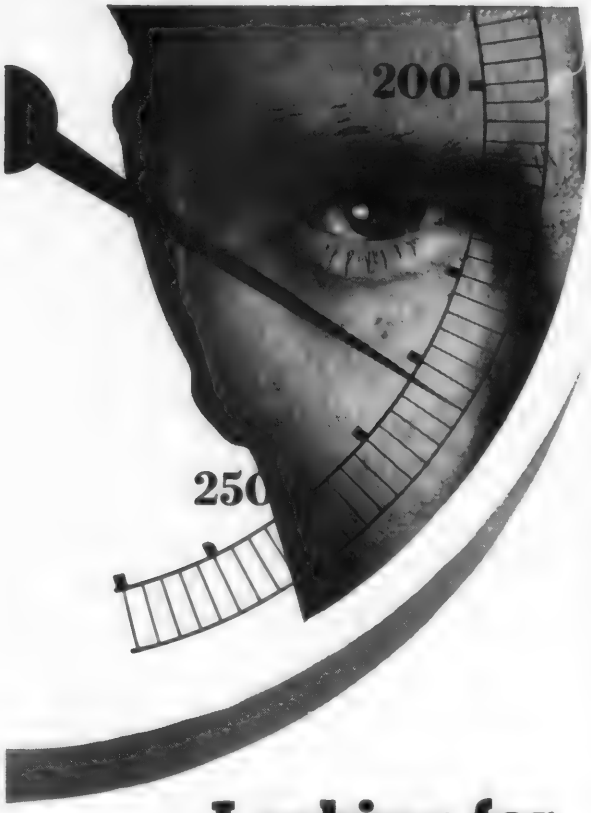

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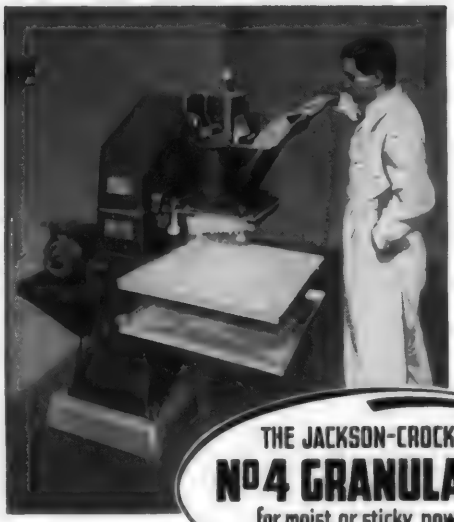

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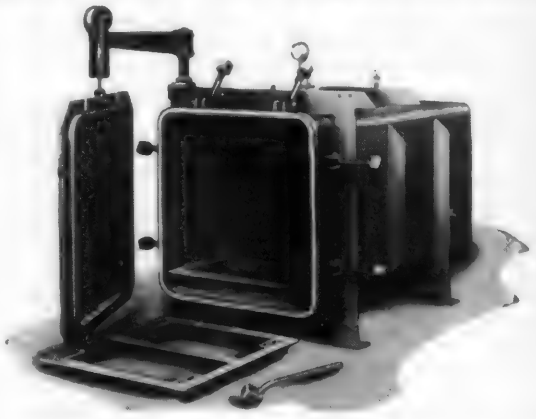

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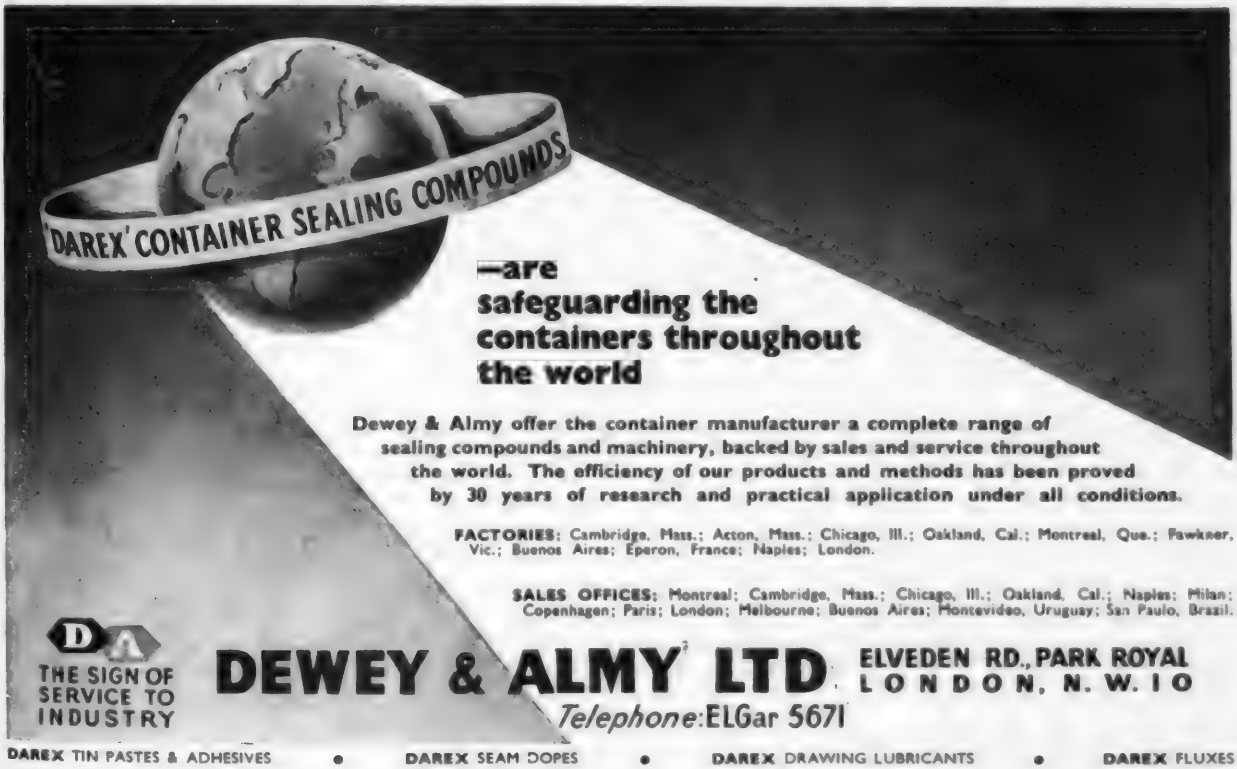

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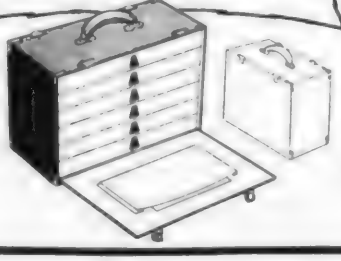

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CHEMISTS and Assistant Chemists are required for analytical and development work in the new laboratory of a large Food Factory situated near Manchester. Applicants for the positions should have the minimum qualification of Ordinary National Certificate, but the senior posts will be filled by chemists of at least Ordinary Degree standard. Experience in the analysis and technology of animal and/or vegetable fats and oils would be an advantage but is not essential. Salaries will be commensurate with qualifications and experience, and a pension scheme is in operation.—Applications with full details of experience to date, age and qualifications, should be addressed to Box B5515. To be received by May 14.

CHEMIST BACTERIOLOGIST. Batchelors Peas Ltd. require a qualified Chemist, under 30 years of age, with some bacteriological experience for new factory at Ashford, Kent. The successful applicant will be required to work at Southall, Middlesex, for a period before moving to Ashford. Good salary, superannuation scheme.—Applicants should write giving age, education and experience to Personnel Officer, Batchelors Peas (Southall) Ltd., Bridge Road, Southall, Middlesex.

LABORATORY Assistants. Batchelors Peas Ltd. require for a new factory at Ashford, Kent, male laboratory assistants aged 16 to 22 years. Minimum qualifications G.C.E. in chemistry at " O " level. Successful applicants will be required to work at Southall, Middlesex, for a period before moving to Ashford. Good salary according to age and qualifications, superannuation scheme at age 21, facilities for further education on day release basis.—Applicants should write giving age, education and experience to Personnel Officer, Batchelors Peas (Southall) Ltd., Bridge Road, Southall, Middlesex.

AMBITIOUS young Canning Factory Executive possessing qualifications and personality for Management invited to apply for position with modern Essex packing station, handling 80/100 tons fruit/vegetables daily. Capable of planning, quality control, supervision labour, etc. Good wages and prospects. Write fully giving details of experience. Interviews arranged London office.—Box B5516.

PRESERVE and Pickle manufacturers require Assistant Works Manager, capable taking over Works Manager on early retirement. Position carries remuneration not less than £1,000 p.a., superannuation scheme available. Assistance with housing if necessary. Applicants should be 35—45 years of age, have practical experience of Industry and Management—A.R.I.C. an advantage. Write giving full details in strictest confidence.—Box B5519.

LARGE manufacturers of highly concentrated protein foods for animal feeding, situated East Riding of Yorkshire have vacancy for first class Production Manager. Applications are invited from individuals with previous experience of the manufacture of feeding stuffs, compounding, dehydration and oil pressing processes plus technical knowledge of plant and machinery. The position is superannuated with excellent prospects and remuneration according to ability.—Apply, giving full details of age, education, qualifications and experience, with salary required and when available to Box B5518.

SITUATIONS VACANT

CHEMIST, A.R.I.C. (experienced food production, preferably knowledge of Confectionery) required by Chocolate Manufacturer, Glasgow. Good salary according to qualification and experience. Pension Scheme and Life Assurance.—Write 1332, Wm. Porteous and Co., Glasgow.

CHEMIST (Research) wanted for old established London Company distilling and compounding Essences and Fruit Concentrates. Progressive position. State experience and salary required. Superannuation available.—Rayner & Co., Ltd., London, N.18.

SITUATIONS WANTED

GERMAN confectionery and chocolate maker, 21 years, with thorough knowledge of the manufacture of chocolate and chocolate products, seeks position in British chocolate factory to improve technical and lingual knowledge.—Offers under Nr. 2107 to Annoncen Expedition E. Kunze Nuernberg-A.

FACTORY Manager, 33. Fruit and vegetable canning, soft drinks and preserve manufacture. Experience in Laboratory, Home and Export sales administration and buying. Enquiries for a home or overseas position welcomed.—Box B5523.

MANAGER, 36, combines practical engineering experience, plant layout and maintenance, process and quality control, with sound technical knowledge of fruit and vegetable canning. Keen, versatile, practical. Seeks responsible progressive position home or overseas.—Box B5521

BUSINESS OPPORTUNITIES

THE proprietor of Letters Patent No. 575160 relating to a *Milk Product and Process of Manufacturing Same* is desirous of exploiting the invention by way of licence or sale.—Enquiries should be addressed to Andrews and Byrne, 201, Bank Chambers, 329, High Holborn, London, W.C.1.

WANTED. Contracts/Sub-contracts for packing. Groceries, etc. Free warehousing and despatch.—Please reply in first instance to Box B5491.

SMALL Wholesale Grocery Business for sale, with small Complete Manufacturing Plant for jams and squashes; three vans, office accommodation adjoining premises. Ground floor area of factory, 2,270 sq. ft.; first floor, 1,760 sq. ft. Freehold property. Midlands area.—Box B5493.

FULL Steam in five minutes with B. and A. Electrode Boilers, used by British industries for twenty-five years. No boilerhouse, no flue, no attendant needed. The most compact and convenient steam raisers available, can go beside machines using the steam.—Write for Leaflet 125, Bastian and Allen Ltd., Ferndale Terrace, Harrow, Middlesex.

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FOR Sale: 250 gal. well-known brand Lolly Syrup, various flavours, as bargain, in free one-gal. glass jars.—Box B5510.

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HARDWOOD Offcuts (miscellaneous) available at realistic prices.—Apply C. F. Anderson and Son Ltd., 117, London Road, Mitcham, or telephone Mitcham 2357.

TO Canners and Fish Paste Manufacturers. W. and A. Thompson Ltd. Quick frozen Dressed Crabmeat specialists. We are now taking orders for new season crabmeat. Lowest prices in the country taken for quantity.—Write for Price List to: Bridge Road, Brighouse, Yorkshire. We guarantee our crabmeat.

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Banks of Solid Drawn 8 gauge Green Band—1¼ in. nominal bore pipe six tube 6 in. centres by 30 ft. lengths complete hanging brackets. Suit large Cold Store. Approximately 12,000 ft. Fraction of cost — ALFRED'S ICES (1954) LTD., 3 Hall Place, Church Street, LONDON, W.2.

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MELANGEUR by Lehmann, 6 ft. diam., cast steel constr., with 10 in. by 6 in. side outlet. Twin granite rolls, 27 in. diam. by 13 in. face underdriven through crown wheel and pinion with bare shaft extension. Ploughs and scrapers mounted on crosshead.
Melangeur with granite bed, 4 ft. diam. by 6 in. deep. Steel sides, granite tapered rolls, 19 in. diam. Pulley drive.
Vert. five-roll Refining Mill by Buhler. Steel-cored rolls 31½ in. by 15 in. diam. Pulley drive.
Pomace Disintegrator and Blower by H. Beare. Blower capacity 6/8 tons pressed pomace per hr. Motorised 10 h.p., 400/3/50. Feed trough.
Twin cyl. steam-heated Drum Drier by H. Simon. Rolls 40 in. by 28 in. diam., 100 lb. w.p., running in plain bearings with steam inlet and condensate outlet. Doctor knife to each roll.
Two unused Vacuum Drying Ovens by Scott, ribbed c.i. constr., in bolted sections. Int. dimens. 6 ft. by 4 ft. 3 in. by 4 ft. 10 in., 16 steam coil shelves. Suitable 27/28 in. vacuum, fitted heavy dished door. With vacuum pump, condenser, etc.
Stainless steel Vacuum Mixer by Hardaker. Trough, 47 in. by 43 in. by 34 in. deep. Twin " Z " blades direct coupled to reduction gear. Domed cover, 24 in. deep with 2 in. vacuum conn. Electrically op. tilting.
Double Trough Mixer, 34 in. by 27 in. by 26 in. deep. Twin " Z " blades. Single spur gearing. Hand tilting, hinged cover. Motorised 400/3/50.
Double Trough Mixer by D. Thompson, m.s. trough, 35 in. by 45 in. by 39 in. deep. Twin " M " shaped blades, motorised 400/3/50. Separately motorised tilting.
Open top stainless steel Vessel, 200 gal., 60 in. by 36 in. by 30 in. deep. Side entry propeller agitator. Dull polished int.
80 gal. s.j., m.s. Boiling Pan with stainless steel lining. 32 in. diam. by 29 in., 1½ in. run off. Hinged lid. Jacket 35 lb. w.p.
Four 40 gal. open top s.j. Boiling Pans by B.C.H., 25 in. diam. by 18 in., with pouring lip. Jacket suitable 60 lb. sq. in. w.p.
Walmer, Mark V, Chocolate Enrober by W. Denis Contacts. Water jacketed chocolate bath with immersion heater and 6 in. wide chain-type conveyor. Cooling section approx. 56 in. long, over 6 ft. centres. Flat belt conveyor 6 in. wide belt. Refrigeration unit cools tunnel, motorised 230/1/50.
Jelly Cutter by Brierley, table 19¾ in. by 19¾ in., adjustable daylight, at present 1⅛ in., 48 sections forming slabs 3½ in. by 2½ in.
New stainless steel Storage Vessels and Tanks, with capacities ranging from 8 gal. to 1,000 gal.

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MISCELLANEOUS WANTS

WANTED: Redundant stocks Custard and Blancmange powder. Packeted or bulk.—Box B5492.

STONE Jars wanted to purchase. Any district.—Full particulars to T. Gunn (Rayleigh) Ltd., 206, London Road, Rayleigh, Essex. Tel.: Rayleigh 87.

DAMAGED or redundant stocks of food, residues or by-products in large or small quantities required.—Send your offers to Rotunda Foods Co., London Office: 50/52, Blandford Street, W.1. Tel.: Welbeck 8465.

SECOND-HAND PLANT FOR SALE

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TRIPLE steel roll Refining Mill by Torrance, rolls 28 in. by 15 in. Inverted type with rolls oscillating.
Vert. 4-roll Refining Mill by Buhler, steel-cored rolls, 29½ in. by 12 in. diam. Built-in hopper.
Vert. 5-roll Refining Mill by Buhler. Steel-cored rolls, 31½ in. by 15 in. diam. Pulley drive.
Twin-roll Drying Machine by Goudsche of Gouda, Holland, fitted two steam-heated rolls approx. 6 ft. 6 in. long by 2 ft. 4 in. diam., suitable 80 lb./sq. in. w.p., arranged f. and l. pulley drive through helical gearing, equipped with knife holders, knives, fume hood, discharge conveyors, etc. (THREE AVAILABLE.)
Horiz. steam-jacketed Drier, 23 ft. by 4 ft. diam. Fitted revolving reel of ten 4 in. diam. tubes around central tube, steam heated. Intermediate paddles for agitation. Jacket w.p. 2 ats. With condenser, wet vacuum pump and fittings.
Twin cyl., steam-heated Drum Drier by H. Simon. Rolls, 40 in. by 28 in. diam., 100 lb. w.p., running in plain bearings with steam inlet and condensate outlet. Doctor knife to each roll.
Steam-jacketed Trough Mixer by Dobson and Barlow. Mixing trough, 53 in. by 43 in. by 46 in. deep. Twin glanded "Z" blade agitators, motorised 400/3/50. Power op. tilting.
10 cwt. stainless steel Vacuum Mixer by Morton. Trough, 47 in. by 44 in. by 34 in. deep. Twin "Z" blades direct coupled to reduction gear, domed cover 16 in. deep with 2 in. vacuum conn. Electrically op. tilting.
Walmer Mark V Chocolate Enrober by W. Denis Contacts. Water-jacketed chocolate bath with immersion heater and 6 in. wide chain-type conveyor. Cooling section approx. 56 in. long, over 6 ft. centres. Flat belt conveyor 6 in. wide belt. Refrigeration unit cools tunnel. Motorised 230/1/50.
New stainless steel Storage Vessels and Tanks, with capacities ranging from 8 gal. to 1,000 gal.

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For sale SCOTT four-band vacuum dryer. Dismantled, cocooned and stored, complete with all ancillary equipment. Low price and immediate delivery — excellent condition. — Write Box B5506.

TWELVE horizontal steam Retorts, 6 ft. by 3 ft., by 3 ft., suitable 15 lb. s.w.p., complete with all fittings, inclusive of trolleys and trays. First-class condition throughout.—Apply C. Skerman and Sons Ltd., 118, Putney Bridge Road, London, S.W.15. Tel.: Vandyke 2406.

COWLES fully automatic Tube Filling, Closing and Crimping Machine with stainless steel hopper and contact parts. Lang, type 27, Emulsifying, Mixing and Disintegrating Machine with nylon-lined water jacketed chamber and direct coupled to 10 h.p. A.C. motor. Several, 40-gal. capacity, copper Tilting Steam Jacketed Pans, 60/100 lb. s.w.p. —Apply C. Skerman and Sons Ltd., 118, Putney Bridge Road, London, S.W.15. Tel.: Vandyke 2406.

TABLE Jelly Manufacturing Plant, comprising B.C.H. No. 2 Heavy Duty Jelly Cutting Machine for sub-divided table jellies, a number of double compartment water jacketed jelly cooling tables, wooden trays and several copper Tilting Boiling Pans.—Details from Box B5520.

SECOND-HAND PLANT FOR SALE

THE Port of Bristol Authority has for disposal one Self-propelled "Airveyor" Portable Pneumatic Grain Elevator, by the Fuller Co., U.S.A. The plant comprises a Rootes blower of 20-40 tons per hour capacity, driven by 115 h.p. "Caterpillar" diesel engine and mounted on pneumatic tyres as a trailer unit coupled to a General Motors' towing unit powered by a 6 cyl. G.M. petrol engine, together with a quantity of 8-in. steel and flexible piping.—Applications for forms of tender to be made to the Engineer-in-Chief, Port of Bristol Authority, Avonmouth Docks, not later than June 7, 1957.

VALCO Potato Crisp Filler for sale, fitted with bag opener. £150 ex works. Flowline Belt Conveyor, 24 ft. length, 14 in. width belt, fitted with side tables. £175.—T. E. Gallagher and Sons Ltd., Earl Street, Belle Green Lane, Higher Ince, Wigan.

THREE Goudsche twin-coil Milk Driers, rolls 80 in. by 28 in., suitable w.p. 80 lb. sq. in. —George Cohen Sons and Co. Ltd., Wood Lane, London, W.12. Tel.: Shepherds Bush 2070 and Stanningley, near Leeds. Tel.: Pudsey 2241.

FOR Sale: Kellie Fruit Filterpress. Sugar or Juice Filterpress. Air Compressor. Stainless steel Tilting Fruit or Peel Cooker, 60 gal. B.C.H. Rotary Jam Cooler A.P.V. 40 gal. B.C.H. Tilting Jam Pan, 100 lb. pressure. Gooseberry Snibber or Vegetable Cleaning Machine.—Box B5509.

BOTTLE Washer for Sale. Powley "Ryte" Washer fitted with two-speed gear; bottle 6 wide, 7-32 oz. size. Complete with gas boiler making an entirely self-contained unit. Inspection London.—Apply Box B5513.

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S.S. Mono Pump, 1½ in. inlets. S.S. Gardner Sifter Mixer, 40 in. by 17 in. by 17 in. S.S. jac. Pans (two), 36 in. by 30 in., 36 in by 38 in., 33 in. by 27 in. and 26 in. by 23 in. S.S. Baker Revolving Dough Mixer, 41 in. by 21 in. S.S. jac. cyl. Mixers, 39 in. by 32 in. and 40 in. by 24 in. S.S.-lined Autoclaves, 6 ft. by 3 ft. diam., 100 lb. w.p. S.S. and chrome Emulsifiers, ¼, ½, 1 and 2 h.p. A.C. S.S. 40 ft. enc. Conveyor/Elevator. S.S. Portable Mitchell Stirrer, 4 ft., ½ h.p. A.C. Twenty "Z" and fin blade Mixers up to 29 in. by 27 in. by 27 in. Twenty Sifter Mixers up to 6 ft. by 2 ft. by 2 ft. deep. Tanks, pumps, refiners, crushers, edge runners, autoclaves, filter presses, hammer mills, disintegrators, ovens, retorts, steam and diesel plant, etc.—Harry H. Gardam and Co. Ltd.

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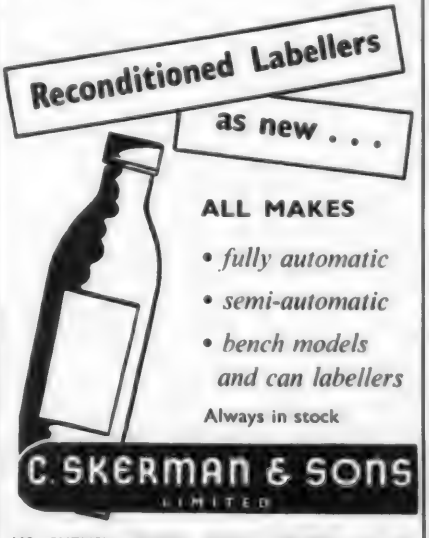
FOUR "Air Receivers," 29 ft. by 7 ft. for 350 lb. w.p., in unused condition, suitable for pressure vessels or steam accumulators.—Box B5485.



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FOR Sale: Gravity Conveyors, rollers 24 in., 18 in., 16 in and 14 in. wide with bends. "Crispa" electric Potato Crisping Machines. Berkel hand Bacon Slicer. 40-gal. copper-lined steam Tilting Pans. "Hammamac" Swing Hammer Grinding Mill, also "Fyna" and Massey Harris ditto. Brockhouse gas-fired steam Boiler, 4 ft. 6 in. by 19 in. diam., 100 lb. pressure.—A. H. Kimmins and Sons Ltd., Lyndhurst Road, Worthing.

250 gal. stainless steel Tanks. 500 gal. s.s. Tank with agitator and motor. Benhil Butter and Margarine Packer. Stainless steel interior Milk Cooling or Cream Ripening Vat. Pasteuriser. Southall and Smith 2 lb. automatic Four Weighing Machine. Mixers, kneaders, racks, provers, baking sheets, etc. Your enquiries welcomed.—Sorensen Bakery Equipment Ltd., 42, Raby Street, Manchester 16. Tel.: Moss Side 2054 and 4054. 'Grams: Rahbek.

FOOD Machines. Down stroke hydraulic Suet Press, 2,500 lb. p.s.i. working pressure. Geo. Driver "Fluidflow" Automatic Weigher and Filler. 100-gal. pan Pasturiser with Agitator. Unused "Weir" Junior Homogeniser. Unused "Weir" 2A Homogeniser. Duckworth Fruit Cleaner and Sifter.—Write Excel Co. Ltd., 92, Carpenters Road, Stratford, E.15.

FOUR large Coffee Percolators, tinned copper mounted; three Storage Tanks; double head Filling Machine; also Centrifuge, for disposal. All practically new.—Enquiries Box B5497.

SMALL complete Jam Manufacturing Unit, consisting of electrode steam boiler, three boiling pans complete with all pipe lines and fittings, rotary filling table, labeller, pulping, cutting, mixing and whipping machines, scales, water softener pans, laboratory equipment. Can be seen any time. Also freehold factory and offices if required. Midlands area.—Box B5494.

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SECOND-HAND PLANT WANTED

M.P. Universal Filling Machine wanted.—Warrington Canners Ltd., Riverside Works, Penketh, Warrington.

GABLE Bar Moulding Plant required, not earlier than about 1936.—Particulars and price to 1146, Wm. Porteous and Co., Glasgow.

WANTED
Diesel engines. Diesel generator sets. Any type surplus diesel plant. Immediate cash. We clear if required. P. R. Lowe and Co., 34a Rainham Road, London, N.W.10. Tel.: LAD 4005.

AUTOMATIC Pea/Bean Filler also continuous Pea Blancher required immediately. Both must be in first-class running order.—Full details and price to Box B5522.

FOR sale: German Multi-purpose Machine. Suitable for cutting, slicing, mixing and mincing vegetables for cannery. Complete with 3-phase 1 h.p. motor. Offers wanted. Newmann Part Labeller as new. Automatic delivery. Type D, Serial No. 394. Single phase 200/230 volts, 1.7 amps, ¼ h.p. Cost £49. Offers wanted.—Box B5525.

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